



# **Superfund Record of Decision:**

## **Organic Chemicals, MI**



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15. Supplementary Notes			11. Contract(C) or Grant(G) No. (C) (G)
16. Abstract (Limit: 200 words)  The 5-acre Organic Chemicals site is an inactive solvent reclamation and chemicals manufacturing facility in Grandville, Kent County, Michigan. The site includes several onsite buildings, structures, above-ground storage tanks and drum storage areas, a boiler facility, a wastewater treatment facility, and a seepage lagoon. Wetlands potentially are located 1,900 feet northwest of the site, and the Grand River is located 0.95 miles to the north of the site. A succession of petroleum-related industries leased the land for petroleum refining from 1941 to 1945, followed by transport and storage operations from 1945 to 1966. Organic Chemicals Inc., (OCI) began site operations in 1968. Company records show that between 1968 and 1980, process waste and cooling water including RCRA hazardous wastes were discharged to the onsite seepage lagoon. In 1979, 2,200 gallons of lacquer thinner were spilled onto the ground onsite and subsequently, some of the spilled thinner was recovered and disposed of onsite in the seepage lagoon. In 1980, discharges to the lagoon ceased, and the company installed a wastewater pretreatment system, which discharged wastes to the sanitary sewer system. Subsequently, in 1981, the seepage lagoon sludge was excavated and disposed of offsite.  (See Attached Page)			13. Type of Report & Period Covered 800/000
17. Document Analysis a. Descriptors Record of Decision - Organic Chemicals, MI First Remedial Action Contaminated Medium: gw Key Contaminants: VOCs (benzene, toluene, xylenes), other organics (PAHs, pesticides) b. Identifiers/Open-Ended Terms  c. COSATI Field/Group			14.
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Abstract (Continued)

In 1983, EPA documented onsite soil and potential ground water contamination resulting from the solvent-contaminated seepage lagoon. Additionally, in 1986, the State determined that OCI was illegally disposing of sludge and other hazardous residuals from the onsite solvent recovery operations by placing these into drums or rolloff containers along with routine non-hazardous waste materials. Analysis of the drum and container contents and soil samples from the vicinity of these storage units revealed the presence of VOCs and other organics. During 1987, OCI, as part of a voluntary investigation, discovered and removed 150 buried drums containing sludge and liquid residues offsite, and identified further onsite soil contamination. Federal and State investigations have determined that site contamination has resulted from past operation of the seepage lagoon by OCI, chemical spills at the site and past oil-related activities. EPA has divided the remediation into two response actions. This Record of Decision (ROD) addresses contamination in the upper ground water system, as an interim remedy. A future ROD will constitute the final response at the site by addressing the remaining onsite ground water and soil contamination. The primary contaminants of concern affecting the ground water are VOCs including benzene, toluene, and xylenes; and other organics including PAHs and pesticides.

The selected remedial action for this site includes onsite pumping and treatment of ground water using a treatment system consisting of an equalization/sedimentation basin, two granular activated carbon vessels, and an air stripper polishing unit; discharging the treated water onsite to the Grand River; disposing of treatment carbon residuals in an offsite landfill; conducting a treatability study and pump test to determine the proper treatment train and pumping rates; and ground water monitoring. The estimated present worth cost for this interim remedial action is \$5,931,000, which includes an annual O&M cost of \$317,000.

PERFORMANCE STANDARDS OR GOALS: This remedial action is only part of a total remedial action and will attain ground water cleanup ARARs during future response actions.

RECORD OF DECISION  
SELECTED REMEDIAL ALTERNATIVE  
FOR THE  
ORGANIC CHEMICALS, INC. SITE  
GRANDVILLE, MICHIGAN

Statement of Basis and Purpose

This decision document presents the selected remedial action for the Organic Chemicals Inc., site in Grandville, Michigan, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record for this site.

The State of Michigan concurs with the selected remedy.

Assessment of the Site

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or to the environment.

Description of the Selected Remedy


This ROD addresses a discrete action at the Site. The selected remedy is an interim action remedy and addresses the ground water contaminant plume in the upper ground-water system at the site. The second operable unit will constitute the final response action at the site addressing the remaining ground water and soil contamination, which are principal threats at the site. The selected remedy consists of the following components:

- Install, operate and maintain an interim ground-water extraction system in the upper ground-water system consisting of, at a minimum, three extraction wells. Install, operate and maintain a physical-chemical ground-water treatment system for the interim ground-water action.



### Statutory Determinations

This interim action is protective of human health and the environment, complies with or waives Federal and State applicable or relevant and appropriate requirements for this limited-scope action, and is cost-effective. Although this interim action is not intended to fully address the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action utilizes treatment and is in furtherance of that statutory mandate. Because this action does not constitute the final remedy for the site, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, although partially addressed in this remedy, will be addressed by the final response action. To the extent practicable, treatment is used as part of the interim action. Subsequent actions are planned to address fully the threats posed by the conditions at this site. Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action. Because this is an interim action ROD, review of this site and of this remedy will be continuing as EPA continues to develop final remedial alternatives for the site.

  
Valdas V. Adamkus  
Regional Administrator

9/30/91  
Date

**Decision Summary for the Record  
of Decision  
Organic Chemicals, Inc. Site  
Grandville, Michigan**

**I. Site Name, Location, and Description**

The Organic Chemicals Inc. (OCI) property is located at 3291 Chicago Drive, S.W., in the city of Grandville, Kent County, Michigan. The OCI property, approximately 5 acres, is fenced, with several buildings, structures, and storage tanks occupying the site (Figures 1 and 2) which extends over several properties. The Chesapeake and Ohio Railroad, which runs southeast of the facility and along the north side of Chicago Drive, has an elevated railbed acting as a barrier to surface drainage. A drainage ditch exists on the west side of the OCI site. There is no visible surface drainage linking the site and the Grand River, which is located approximately 0.95 miles north. Two gravel quarries have been identified near the OCI site. One quarry is located 0.3 miles northwest, and the other quarry is 0.2 miles northeast of the site. Both quarries are inactive and filled with water. An oil well, 1700 feet northwest of the site, was operational until this year. Potential wetland areas are 1900 feet northwest of the site on the opposite side of I-196.

The OCI property has several buildings and structures occupying the property. The chemical manufacturing operation, which is housed in two buildings along the western boundary of the property, produces small quantities of specialized industrial chemicals and pharmaceutical intermediates. The solvent recovery operation is housed in several buildings along the southeastern portion of the property. Other structures include a warehouse, several drum and storage tank areas, an office building, a boiler facility and a waste water pretreatment facility.

Two railroad sidings parallel the southern and eastern OCI property boundaries (Figure 2). Along the sidings are the remnants of a series of aboveground storage tank facilities. Although the tanks no longer exist, the concrete footings and underground piping connections remain.

The OCI property is bordered by Packaging Corporation of America on the east, by the former Haven-Busch Co. on the west, and by Grand Rapids Gravel Co. on the north and these properties are also part of the OCI site. The property directly north and northwest of OCI has a lower ground surface elevation due to earlier sand and gravel mining activities. Residential areas are approximately 200 feet southeast of the site and 1700 feet to the southwest.

**II. Site History and Enforcement Activities**

**A. Site History**

The OCI site is situated approximately 0.95 miles southeast of the Grand River. The site has been previously used for petroleum refining from 1941 to 1945, and transport and storage operations from 1945 to 1966. A succession of petroleum-related industries leased the land prior to its purchase by Spartan Chemicals. Anne R. Herald, owner of the property from approximately 1900 to 1942, issued an oil and gas lease for the entire property to Gerald J.

Wagner on December 7, 1937. Mr. Wagner then leased the premises for oil and gas exploration to various third parties. During tenure of these leaseholds, two oil production wells were drilled onsite. One was a dry hole and the other was never completed or maintained. Attempts made to identify the exact locations of these wells by reviewing existing data were unsuccessful.

All oil and gas exploration leases were summarily voided by Ms. Herald on February 7, 1941. Other petroleum industry operations commenced onsite in the early 1940's. Total Pipeline Corporation, a petroleum transporter, leased an oil and gasoline warehouse and tank facility onsite during this period. Its facilities were then taken over by its parent company, Total Petroleum, Inc., which operated onsite through 1964. Leonard Fuels purchased the site in 1964 and sold the property to Total Realty in 1966. In 1968, Spartan Chemical Company acquired the site property for the solvent reclamation and chemical manufacturing operations of its subsidiary, Organic Chemicals Company (now Organic Chemicals, Inc.). Organic Chemicals, Inc. (OCI) has operated on the site since 1968. In 1979, OCI became the owner of the premises by conveyance of deed from Spartan Chemical Company.

Historical aerial photographs, taken from 1960 through 1978, show changes to the physical facilities of the OCI site. In a 1960 photograph, three large vertical tanks with two sumps for containing spills were present along the northwestern portion of the former refinery. By 1967, these tanks were no longer present. In 1973, the terrain on the western portion of the former refinery was being regraded and leveled. The ground was visibly scarred from earth moving activity. In this same year there was a seepage lagoon on the OCI property which appeared to contain liquid waste. Two new buildings and six additional vertical storage tanks had been added to the facility in 1973. A 1978 aerial photograph indicates that the west portion of the former refinery was abandoned. This area is now owned by Haven-Busch, Co. and was being used as an open storage yard for this steel fabrication company. Haven-Busch Co., has since closed both their corporate office and their steel fabrication plant.

In March 1976, a water well was drilled on the OCI property. The well was 165 feet deep and was used to provide plant production and cooling water. Because of various problems with the performance of the well, it was abandoned and the plant returned to the use of water supplied by the city of Grandville.

A chemical fire occurred onsite on October 11, 1976, damaging part of the OCI facilities. The cause of the blaze was reported as being started by a spark from a metal drum dragged across a floor. The spark ignited barrels of solvents stored nearby. According to retired Grandville Fire Chief Osterink, the fire was contained in the building and prevented from spreading to other storage tanks outside.

A chemical spill at the site in November, 1979, was reported to the Michigan Department of Natural Resources (MDNR) by OCI. On November 3, 1979, 2,200 gallons of lacquer thinner were spilled by an operator onto the ground onsite. Some of the spilled lacquer thinner was recovered and disposed of in the onsite seepage lagoon.

The OCI site was classified, on April 14, 1980, as a potential hazardous waste site by the EPA. The EPA summarized the problem in its Potential Hazardous Waste Site log as "known groundwater contamination by organic solvents." Between 1968 and 1980, company records indicate that OCI discharged its process waste and cooling water, which included F001-F005 hazardous wastes into the onsite seepage lagoon. In June 1980, OCI ceased discharge of wastewater to the seepage lagoon. In 1980, the company installed a wastewater pretreatment facility with discharge to the City of Grandville Sanitary Sewer system. The pretreatment facility included two 9,000 gallon sedimentation tanks and a 30,000 gallon aeration basin with pH adjustment.

In September 1981, seepage lagoon sludges were excavated and transferred to railroad cars. The total removed soil filled approximately seven railroad cars. These sludges were disposed of at Chem-Met Services Inc., in Wyandotte, Michigan.

A Preliminary Assessment (PA) for the site was completed by EPA in 1983. The PA documented potential groundwater contamination from the solvent-contaminated seepage lagoon. Soils beneath this pond were also found to be contaminated. A potential for drinking water contamination and endangerment of flora and fauna in nearby potential wetlands was indicated in the PA.

In September 1986, MDNR Law Enforcement Division personnel responded to a complaint of alleged illegal disposal of hazardous wastes at the facility. Reportedly, OCI personnel were disposing of sludges and other residues generated from the solvent recovery operations by placing these materials into drums and rolloff containers along with their normal nonhazardous solid waste materials. Analyses taken from solid waste storage units (rolloffs and 55 gallon drums) located at the site revealed the presence of various contaminants including methylene chloride, toluene, ethylbenzene, xylenes and arochlor 1242 (PCB). Analyses of soil samples taken from the vicinity of the solid waste storage units revealed the presence of methylene chloride, toluene, xylenes, 1,1,1-trichloroethane, trichloroethene, tetrachloroethene, chloroform, 1,1-dichloroethene, 1,2-dichloroethene, and Aroclor 1242 (PCB).

As a result of this investigation, OCI was cited by the EPA on December 3, 1986, to be in violation of Resource Conservation and Recovery Act (RCRA). Among the violations cited were: (1) the unreported generation of hazardous waste from a drum cutting operation; (2) the routine transport of hazardous waste from the site by unauthorized agents; (3) failure to prepare hazardous waste manifests, and (4) shipment of hazardous waste to unauthorized facilities. Based on these findings, the EPA levied fines of \$22,500 on OCI.

During August/September 1987, OCI conducted a voluntary investigation in cooperation with MDNR. Approximately 150 buried drums were discovered and removed from the southwest corner of the OCI warehouse building. Some of these drums contained sludge and liquid residues. Groundwater samples taken at that time from Prein & Newhof's monitoring well, B-11, indicated the presence of 1,1-dichloroethene, 1,1-dichloroethane, cis-1,2-dichloroethene, dibromochloromethane, toluene, ethylbenzene, and xylenes. Monitoring well B-11 was located

south and slightly west of the warehouse building. The drum burial area was excavated down to approximately 17 feet below grade. Soil samples from the bottom of the excavation indicated methylene chloride (13 ug/kg) and tetrachloroethene (2.7 ug/kg) contamination.

## B. Previous Investigations

In November 1979, the MDNR requested that OCI perform a hydrogeological study to investigate suspected groundwater contamination. This study, conducted in four phases, was completed in October 1981. It concluded that the groundwater flow in the upper groundwater system at the site was northwesterly towards the Grand River. Soil borings identified a sand and gravel aquifer existed over a clay layer. The elevation of the top of the clay layer was found to vary throughout the area. It was deepest below the area of the former seepage pond. The elevation of the top of the clay layer was found to be shallowest 1,000 feet west of the OCI property. It was concluded that this caused a plateau in the water table by restricting the westward movement of the groundwater.

Twenty-four monitoring wells were installed during this study. Analysis of monitoring wells north and west of the former seepage pond revealed the following contaminants: methylene chloride, toluene, 1,1-dichloroethene, trans 1,2-dichloroethene, 1,2-dichloroethane, trichloroethene, benzene, chlorobenzene, ethylbenzene, pentachlorophenol, xylene, acetone, 2-propanol, 4-methyl-2 pentanone, trifluoromethylbenzene, naphthalenes, and various aliphatic hydrocarbons.

Analyses of surface soil samples taken from the OCI facility revealed the presence of methylene chloride, toluene, xylenes, 1,1,2-trichloroethane, trichloroethene, tetrachloroethene, chloroform, 1,1-dichloroethene, 1,2-dichloroethene and Aroclor 1242 (PCB).

The investigation also attempted to determine the rate of groundwater flow. Using soil samples obtained during the different phases of the investigation and the hydraulic gradient determined from groundwater elevations, the rate of groundwater flow was estimated by the Kozeny-Carmen Equation. Due to the various soil strata encountered, which have various amounts of fines in with the gravel; it was extremely difficult to accurately determine the rate of groundwater flow. The calculations indicated that the groundwater flow rate may vary from approximately 0.3 feet per day to as high as 1.5 feet per day or possibly higher in localized areas of extremely high permeability.

In the fall of 1988, EPA and the ARCS V project team conducted preliminary field investigation (PFI) activities with the objective of further characterizing the OCI site. A description of PFI activities can be found in the PFI Quality Assurance Project Plan (QAPP). The information gathered during the PFI was incorporated in the planning and implementation of the Phase I RI activities. Analytical results obtained during the PFI study are presented in Appendix C of the Focused Feasibility Study (FFS).

### C. CERCLA Enforcement

On March 30, 1988, a letter was sent to both OCI and Spartan Chemical pursuant to Section 122(a) of CERCLA informing them that work pursuant to 104(a) of CERCLA would be undertaken by EPA because OCI and Spartan lacked the financial capability to perform an RI/FS. On April 9, 1991, a General Notice letter was sent to OCI and Spartan; also on April 9, 1991, a General Notice Letter and Information Request was sent to 182 PRPs who were customers of OCI and are considered generators of hazardous waste at OCI, pursuant to 107(a)(3) of CERCLA.

### III. Highlights of Community Participation

A Community Relations Plan was finalized for the OCI site in February 1989. This document lists contacts and interested parties throughout the government and the local community. It also established communication pathways to ensure timely dissemination of pertinent information. A fact sheet outlining the RI sampling program was distributed in May of 1989. An RI public availability session was held on May 10, 1989. A second fact sheet was distributed in January of 1991 outlining this interim action for the upper ground-water system. The FFS was finalized on July 17, 1991. The Proposed Plan for the interim action at the OCI site was released to the public on July 18, 1991. All of these documents, including the analytical data upon which this decision was based, were made available in both the Administrative Record and the information repository maintained at the Grandville Public Library at 3141 Wilson Avenue in Grandville. The notice of availability of these documents was published in the Grand Valley Advance on July 16, 1991, and the Grand Rapids Press on July 18, 1991.

A public comment period was held from July 22 through August 20, 1991. A public meeting was held on August 6, 1991, to present the results of the FFS and the preferred alternative as presented in the Proposed Plan for this interim action. All significant comments which were received by EPA prior to the end of the public comment period, including those expressed verbally at the public meeting, are addressed in the Responsiveness Summary, which is attached to this Record of Decision.

### IV. Scope of Response Action

EPA has organized this project into at least two response actions. The first response action is an interim action to address contamination in the upper ground-water system (UGS) by stopping the contaminant plume migration. The second response action will constitute the final response at the site addressing the remaining groundwater and soil contamination. Sufficient information exists to begin remediation of the upper groundwater system, although further investigation is required of the soil, upper and lower groundwater system (LGS), oil and the OCI facility, if RCRA closure can not be attained prior to selecting a final remedy.

This interim action is intended to provide for protection of human health and the environment by halting migration of the contaminants in the UGS. This interim action will be consistent to the extent possible with the final site remedy.

## V. Site Characteristics

The primary contaminants at the site are associated with the past operation of the seepage pit by OCI, chemical spills at the site and past oil related activities. (Figure 3) These contaminants include high levels of chlorinated solvents and benzene, ethylbenzene, toluene, and xylene (BETX) compounds. Lower concentrations of other volatile and semi-volatile organic compounds were also detected. The nature and extent of contamination is presented in the FFS report and summarized in the following sections.

### A. Hydrogeologic Characteristics and Groundwater Contamination

Shallow groundwater at the OCI site occurs in the saturated unconsolidated deposits of sand and gravel, which range in thickness from 30 to 4 feet. There are no known residential wells that draw water from these deposits. The sand and gravel deposits are underlain by clay throughout the site except at SB-10 (Figures 4 through 8), which encountered shale directly below the sand and gravel deposits. The thickness of the clay varies from 0 feet at SB-10 to 35.5 feet at MW-20. The Michigan formation underlies the clay unit and consists of interbedded gypsum, limestone and shale with occasional sandstone lenses. The Marshall Sandstone formation underlies the Michigan formation and is the source of groundwater for private and industrial wells and is a Class I aquifer. Residential areas are located to the southeast and southwest of the site. Potential wetland areas and the Grand River are located on the other side of I-196. OCI related contamination has not reached this area, although contamination is moving in this direction and may eventually reach there unless halted.

Ground water flow in the unconsolidated deposits is to the northwest towards the Grand River. Ground water flow in the LGS also appears to move in a northwesterly direction, although additional wells are necessary to accurately determine flow direction.

The LGS is a confined and locally unconfined (where the clay unit is not present). The hydraulic conductivity in the UGS at MW-15 was  $3.9 \times 10^{-4}$  cm/sec, typical of a well-graded silty sand, and  $2.32 \times 10^{-2}$  cm/sec at MW-3, typical of a silty sand with some gravel. The hydraulic conductivity values for the UGS ranged from  $6.91 \times 10^{-5}$  cm/sec at MW-8 to  $1.53 \times 10^{-1}$  cm/sec at MW-22.

### A. Monitoring Wells

Two rounds of groundwater samples were collected from 25 of the 26 monitoring wells installed during the field investigation (Figure 9). Monitoring well MW-12 was not sampled due to insufficient water in the well. Groundwater samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, metals and cyanide. Analyses

were also conducted for TOX, TOC, COD, BOD, TSS, TDS, alkalinity and chloride. Appendix E in the FFS presents analytical results of both rounds of groundwater sampling. These analytical results are summarized on Figures 10 and 11 and in Tables 1 and 2.

The groundwater samples with the greatest number and highest concentration of contaminants were from MW-1 and MW-2 ( $>10,000$  ug/L total organic contaminants). These wells are located in the area of the former seepage lagoon. Contaminants detected in the samples from these wells included high levels ( $>100$  ug/L organic contaminants) of chlorinated solvents and BETX compounds (i.e., Benzene, Ethylbenzene, Toluene and Xylene). Lower concentrations of other volatile and semi-volatile organic compounds were also detected (Figure 10).

Groundwater samples from MW-4, MW-5, and MW-22 also contained relatively high concentrations of organic compounds ( $>100$  ug/L total organic contaminants). Groundwater samples from MW-3, MW-6, MW-11, MW-16, MW-18, and SB-10 contained much lower organic contaminant concentrations (ranging from 10 to 100 ug/L total organic contaminants). Groundwater samples from MW-16 and SB-10 contained total organic contaminant concentrations of 3 and 0 ug/L during Round 1 sampling and 57 and 31 ug/L during Round 2 sampling, respectively. The widespread occurrence of bis (2-ethyl hexyl) phthalate and methylene chloride at very low levels ( $<40$  ug/L) in the groundwater and rinsate samples, during groundwater sampling rounds 1 and 2, is suspected to be due to sampling or laboratory contamination.

The majority of the organic contamination detected in the groundwater was from samples taken from wells located near or on the OCI property. Isoleth contours of the total organic contamination, (Figure 10) indicate that contaminant migration is predominantly from source areas on the property in the north and west. Most of this contamination is in the upper groundwater system. However, contamination ( $>10$  ug/L and  $<100$  ug/L total organic contamination) was also detected in groundwater samples from SB-10, MW-18 and MW-19 which were screened in the lower groundwater system. Table 3 compares estimated concentrations used in the risk analysis with maximum contaminant levels (MCLs) for drinking water.

Organic contaminants detected in the samples from MW-16 are more typical of petroleum wastes (BETX and polynuclear aromatic hydrocarbon compounds). This well is located near old petroleum waste ponds which were in use in the 1950s. Some of these ponds still contain black tar-like wastes. It was suspected that these ponds may represent a separate source of contamination and that releases from these ponds may be responsible for the contamination noted in the samples from MW-16.

Inorganic analytes were detected in all groundwater samples at varying concentrations (Figure 11). Inorganic concentrations in the samples from MW-17 (UGS) and MW-20 (LGS) were assumed to represent naturally occurring background levels, in both groundwater systems because these wells were located approximately 500 feet upgradient of the OCI site in a residential setting. All samples were filtered and had high turbidity.



Eleven inorganic contaminants were detected in concentrations significantly above background (i.e., > 5 times): aluminum, arsenic, barium, chromium, iron, lead, mercury, nickel, potassium, sodium, and vanadium. The MCLs for these contaminants are as follows: aluminum -, arsenic -, barium (5000 ug/L), chromium (100ug/L), iron -, lead (5ug/L), mercury (2ug/L), nickel (100ug/L), potassium -, sodium -, and vanadium -.

Aluminum was detected at levels significantly above background in groundwater samples: MW-21 (Round 2: 17,200 ug/L), and MW-23 (Round 2: 9,220 ug/L).

Arsenic was detected at levels significantly above background in groundwater samples: MW-1 (Round 1: 12.1 ug/L), MW-2 (Round 2: 22.5 ug/L), MW-4 (Round 1: 10.4 ug/L, Round 2: 13.8 ug/L), MW-5 (Round 1: 26.8 ug/L, Round 2: 35.7 ug/L), MW-6 (Round 1: 5.3 ug/L, Round 2: 11.6 ug/L), MW-10 (Round 1: 6.6 ug/L, Round 2: 13.2 ug/L), MW-11 (Round 1: 8.2 ug/L, Round 2: 20.5 ug/L), MW-15 (Round 1: 6.4 ug/L, Round 2: 13.3 ug/L), MW-16 (Round 2: 19.3 ug/L), MW-22 (Round 1: 6.6 ug/L, Round 2: 7.9 ug/L) and MW-23 (Round 2: 9.3 ug/L).

Barium was detected at levels significantly above background in groundwater samples: MW-11 (Round 1: 268 ug/L, Round 2: 593 ug/L), and MW-14 (Round 1: 239 ug/L, Round 2: 210 ug/L). Chromium was detected at levels significantly above background in groundwater samples: MW-7 (Round 2: 57.3 ug/L) and MW-14 (Round 2: 94.1 ug/L).

Iron was detected at levels significantly above background in groundwater samples: MW-11 (Round 2: 24,800 ug/L), and MW-21 (Round 2: 20,200 ug/L). Lead was detected at levels significantly above background in groundwater sample MW-11 (Round 2: 47.1 ug/L). Mercury was detected at levels significantly above background in groundwater samples: MW-22 (Round 2: 5 ug/L) and SB-8 (Round 2: 5 ug/L). Nickel was detected at levels significantly above background in groundwater samples: SB-7 (Round 2: 75.9 ug/L) and SB-10 (Round 2: 94.4 ug/L).

Potassium was detected at levels significantly above background in groundwater sample SB-10 (Round 2: 77,100 ug/L). Sodium was detected at levels significantly above background in groundwater samples: MW-3 (Round 1: 484,000 ug/L, Round 2: 1,000,000 ug/L), MW-14 (Round 2: 468,000 ug/L), MW-18 (Round 2: 384,000 ug/L), MW-19 (Round 1: 509,000 ug/L, Round 2: 849,000 ug/L), SB-7 (Round 1: 3,000,000 ug/L, Round 2: 4,000,000 ug/L), SB-8 (Round 2: 1,000,000 ug/L) and SB-10 (Round 2: 4,000,000 ug/L).

Vanadium was detected at levels significantly above background in the groundwater sample from MW-21 (Round 2: 30 ug/L).

Analytical results from groundwater sampling rounds 1 and 2 for TOX, TOC, COD, BOD, TSS, TDS, alkalinity, pH, specific conductivity and temperature are presented on Tables 1 and 2, respectively. The results of the TOX and TOC analyses received a data qualifier, "J," because the required sample holding times were exceeded by the laboratory. Since the sampling holding

times were exceeded, this data was considered unreliable. In order to obtain reliable data, groundwater was resampled September 4-12, 1990. The parameters that the resampled groundwater were analyzed for are denoted on Tables 1 and 2.

#### B. Residential Well Analytical Results

Four residential well samples were collected during Round 1 groundwater sampling: September 9-26, 1989 all are screened in the LGS. Three residential well samples (PW-1, PW-2 and PW-3) were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, metals, cyanide, alkalinity, BOD5, TOC, COD, TDS, and TOX. Residential well sample PW-7 was analyzed only for volatile organic compounds. These analytical results are presented on Pages E-4, E-8, E-16 and E-20 (Appendix E). The residential well sampling locations are presented in Figure 9.

Two types of volatile organic compounds were detected: methylene chloride and toluene. Methylene chloride was detected in PW-1 and PW-2 at a concentration of 8 ug/L. Toluene was detected in PW-3 at a concentration of 0.5 ug/L.

Two types of semi-volatile organic compounds were detected: bis(2-ethylhexyl)phthalate and benzoic acid. Bis(2-ethylhexyl)phthalate was detected in PW-1 and PW-3 at concentrations of 2 and 3 ug/L, respectively. Benzoic acid was detected in PW-1 at a concentration of 2 ug/L.

Two inorganic contaminants were detected at levels significantly above background (i.e., > 5 times): lead and zinc. Lead was detected at levels significantly above background in residential well PW-1 at a concentration of 173 ug/L. Zinc was detected at levels significantly above background in residential wells PW-1 (294 ug/L), PW-2 (1,180 ug/L) and PW-3 (337 ug/L).

#### C. Contaminant Migration Routes

Two major mechanisms provide the potential for migration of contaminants from soil to groundwater at the site. First, percolation of rainwater through the soil results in vertical leaching of contaminants to the underlying groundwater systems. Second, seasonal fluctuations in the shallow unconfined groundwater system allows groundwater to come into contact with typically unsaturated contaminated soils. Once the groundwater contacts these soils, contaminants may solubilize in the groundwater. Even though there has been a continual flushing and dissolution of compounds by these natural processes, residual contamination remains in the surface and subsurface soils. These contaminants have low solubilities and strongly adsorb to soils. Thus, there may essentially be a continuous source of groundwater contamination due to contaminated soils at the facility.

Analytical results from the field investigation indicated that the unsaturated soils serve as a continual source of contamination to the groundwater. Three major source areas at the site were identified based on the RI analytical results. These areas are (Figure 3): former seepage lagoon, former lacquer thinner spill site and petroleum sludge lagoons. The total organic

compounds in soil exceeds 2,747,000, 85,600 and 149,000 ug/kg, respectively, at these areas.

Other areas at the facility which may be ongoing sources of groundwater contamination are: the area near soil boring (SB-10) where a subsurface soil sample at a depth of 3 to 5 feet contained 20,200 ug/kg total organic contaminants; the area at MW-16 where a subsurface soil sample at a depth of 11 to 12.5 feet contained 7,050 ug/kg total organic contaminants as shown in Figure 12; stained soil in a trench due west of the OCI chemical building (Figure 13), as represented by surface soil samples SS-19, SS-20 and SS-21 which contained 76,500 ug/kg total organic contaminants; and stained soil approximately 300 feet north of the former seepage lagoon, as represented by surface soil sample SS-6 which contained 370,000 ug/kg total organic contaminants.

The subsurface soil samples collected from MW-1 and MW-2 during the RI indicate that the saturated soil aquifer matrix directly beneath the former seepage lagoon is contaminated. The contaminants detected in the soil at a depth of 11 to 12 feet (MW-1) are identical to those detected at a depth of 21 to 22 feet (MW-2), indicating that the contaminants from the lagoon have migrated downward to the clay unit. Several compounds disposed of at OCI are known as nonaqueous phase liquids (NAPLs), because of their low solubility and hydrophobicity (i.e., low octanol/water coefficient). Many compounds, such as trichloroethene and tetrachloroethene, are denser than water and are known as dense nonaqueous phase liquids (DNAPLs). When initially disposed of in the former seepage lagoon, these DNAPLs may have migrated vertically downward as undissolved free product within the upper groundwater system and formed pools of free product at the upper boundaries of the Clay unit directly below the former seepage lagoon. The former seepage lagoon subsurface soil analytical results are presented below:

<u>Compound</u>	<u>Seepage Lagoon Subsurface Soil Results (ug/kg)</u>	
	(SAMPLE DEPTH)	
	(11-12 ft)	(21-22 ft)
Trichloroethene (D)	100,000	30,000
2-methylnapthalene (D)	170	--
Toluene (L)	1,800,000	490,000
Chlorobenzene (D)	94,000	38,000
Ethylbenzene (L)	93,000	41,000
Styrene (L)	--	16,000
Xylene (L)	360,000	120,000
N-nitrosodiphenylamine (L)	18,000	240,000
Bis(2-ethylhexyl)phthalate (L)	4,800	47,000
Naphthalene (L)	400	12,000
Arochlor 1248	1400	--

where: (D) = density greater than water  
(L) = density less than water

Organic compounds that are less dense than water, such as ethyl benzene, toluene and xylene, were also found in the deep (21-22 ft) subsurface soil sample. These compounds may have been dissolved in organic matrices along with DNAPLs, creating a mixture having a density greater than water which would have a tendency to migrate vertically downward. Sampling was not performed that would confirm that free product was on top of the clay.

### C.1 Groundwater Migration

The hydraulic gradient in the upper groundwater system is to the northwest from the facility toward the Grand River. The analytical results of groundwater samples confirms that contaminants from the facility have migrated approximately 1,000 feet north and northwest as shown on Figure 10. The highest contamination in the upper groundwater system is located directly below the former seepage lagoon. Contaminant concentrations within this system decrease as the groundwater flows northwest to below 100 ug/L approximately 500 feet from the former seepage lagoon. Contamination has also been found in the LGS in MW-18 and 19 as stated above, approximately 250 west of the former seepage lagoon. Contamination will be further investigated as part of the final response action.

### D. Contaminant Characteristics and Behavior

The hazardous substances identified from analysis of environmental media samples during the RI are discussed in terms of their chemical/physical characteristics and environmental behavior.

#### D.1 Suspected Contaminants

A list of the organic compounds detected in all sample media analyzed during the RI is presented in Table 4. The environmental media sampled at the site contained aromatics, chlorinated aliphatics and chlorinated alkanes. Phthalate esters were also detected. Analyses for each media also detected unknown compounds. The analytical results of tentatively identified compounds is presented in Appendix E of the FFS.

##### D.1.a Environmental Behavior

The following section assesses the environmental behavior of the compounds detected during the RI. This information is used to evaluate the potential for future contaminant migration.

The migration potential of an organic contaminant was assessed using a calculated mobility index. The mobility index (MI) is a measure of the contaminants relative tendency to migrate in the environment and reflects a contaminant's migration potential in water, air, and soil. It can be represented as:

$$MI = \log[(\text{water solubility} \times \text{vapor pressure})/K_{oc}]$$

The following table is a general guide to the Water Mobility Index and the relative mobility of compounds.

<u>Relative Mobility Index</u>	<u>Mobility Descriptions</u>
> 5.00	Extremely Mobile
0.0 to 5.00	Very Mobile
-5.0 to 0.00	Slightly Mobile
-10.0 to -5.00	Very Immobile

● **Chlorinated Ethenes.** Chlorinated ethenes including tetrachloroethene, trichloroethene, 1,1-dichloroethene, and 1,2-dichloroethene (total) were detected in groundwater, surface soil, and subsurface soil samples collected during the RI. Tetrachloroethene, trichloroethene, and dichloroethenes are common degreasing and extraction solvents. It is also known that the dichloroethenes are potential anaerobic degradation products of tetrachloroethene and trichloroethene.

#### MOBILITY INDICES FOR CHLORINATED ETHENES

<u>Compound</u>	<u>Mobility Index</u>	<u>Mobility</u>
Tetrachloroethene	0.87	Very Mobile
Trichloroethene	2.70	Very Mobile
1,1-Dichloroethene	4.32	Extremely Mobile
Trans-1,2-Dichloroethene	4.54	Extremely Mobile

Groundwater samples from monitoring wells near or at the OCI facility contain high concentrations of tetrachloroethene and trichloroethene. Groundwater samples taken from monitoring wells downgradient from the facility had concentrations of tetrachloroethene and trichloroethene which were much lower than those found in samples taken from wells nearer to the facility. For example, samples collected on the OCI facility, from MW1, contained 160 mg/L (J) of tetrachloroethene and 21,000 ug/L of trichloroethene. Samples that were collected 250 feet west of the seepage lagoon, MW4, did not contain either of these compounds (Figure 9).

● **Chlorinated Ethanes.** Groundwater, surface soil, and subsurface soil samples taken during the RI contained 1,1,1-trichloromethane, 1,1,2,2-tetrachloroethane, 1,1-dichloroethane, and 1,2-dichloroethane. Chlorinated ethanes are widely used as degreasing and extraction solvents and intermediates in chemical synthesis. Like the chlorinated ethenes, chlorinated ethanes can also

undergo anaerobic reductive dehalogenation. Therefore, the dichloroethanes are potential anaerobic degradation products of tetrachloroethane and trichloromethane.

In general, as the number of chlorine atoms per molecule decrease, the water solubilities and vapor pressures increase and the organic carbon partition coefficients decrease. This would indicate that the relative mobilities as represented by the mobility index, would increase with a decrease in chlorine contents, as show below:

#### MOBILITY INDICES FOR CHLORINATED ETHANES

<u>Compound</u>	<u>Mobility Index</u>	<u>Mobility</u>
1,1,1-trichloroethane	3.08	Very Mobile
1,1-dichloroethane	4.59	Very Mobile
1,2-dichloroethane	5.19	Extremely Mobile

As with chlorinated ethenes, the mobility index or migration potential of chlorinated ethanes increases with a decrease in chlorine content. In MW1, samples collected on the OCI facility contained 6 ug/L (J) of 1,1-dichloroethane and 51 ug/L (J) of 1,2-dichloroethane. Samples that were collected 250 feet west of the seepage lagoon, MW4, contained 6 ug/L of 1,1-dichloroethane and no 1,2 dichloroethane (Figure 10).

- Aromatics. Benzene, toluene, chlorobenzene, ethyl benzene and xylene were detected in the ground water, surface soil, and subsurface soil, during the RI. These compounds, characterized as containing an aromatic or benzene ring, are common chemicals used in a variety of industrial processes.

The calculated mobility indices for the aromatic compounds are shown below. The mobility indices suggest that aromatic compounds are generally less mobile than chlorinated ethenes and ethanes. This is substantiated by the data, for example, the concentration of toluene dropped from 42,000 ug/L (J) in MW1 to 1 ug/L (J) in MW4, while the concentration of 1,1-dichloroethane remained the same from MW1 to MW4 (Figure 10).

#### MOBILITY INDICES FOR AROMATIC COMPOUNDS

<u>Compound</u>	<u>Mobility Index</u>	<u>Mobility</u>
Benzene	3.3	Extremely Mobile
Ethylbenzene	-0.01	Slightly Mobile
Chlorobenzene	1.2	Very Mobile
Toluene	1.7	Very Mobile
Xylene	0.9	Very Mobile

1,2-dichlorobenzene	-0.23	Slightly Mobile
1,3-dichlorobenzene	-0.78	Slightly Mobile
1,4-dichlorobenzene	0.05	Very Mobile
1,2,4-trichlorobenzene	-1.24	Slightly Mobile

#### Tentatively Identified And Unknown Compounds.

● Tentatively identified and "unknown" compounds were detected in the groundwater, surface soils, subsurface soils and test pit soils at the OCI site. These analytical results are presented in Appendix E of the FFS.

Based on the above information, it is necessary to implement this interim action to stop migration of the contaminant plume.

#### VI. Summary of Site Risks

The following groundwater exposure scenario was evaluated quantitatively: a future ingestion of drinking water for adults only and potential for current ingestion of drinking water from the private wells. Due to the limited scope of the FFS and the unlikelihood of future residential land use, only one exposure pathway was chosen to evaluate potential future adverse health risks associated with exposure to contaminated groundwater. This scenario assumes that contaminated ground water will migrate to the LGS where it would be a potable water source.

##### A. Toxicity Assessment Summary

Cancer potency factors (CPFs) have been developed by U.S. EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of  $(\text{mg/kg-day})^{-1}$ , are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied. See Table 5.

Reference doses (RfDs) have been developed by U.S. EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors assure that the RfDs will not underestimate

the potential for adverse non carcinogenic effects to occur.

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g.,  $1 \times 10^{-6}$  or  $1\text{E-}6$ ). An excess lifetime cancer risk of  $1 \times 10^{-6}$  indicates that, as a plausible upper bound, an individual has a one in a million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific conditions at a site.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminants reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single or across media.

Excess cancer risk estimates were calculated for exposures to carcinogenic indicator chemicals by summing the product of the chronic daily intakes (CDI) and cancer potency factor for all carcinogenic indicator chemicals and intake routes for a given human receptor. Hazard indices were calculated for exposures to non-carcinogenic indicator chemicals by summing the ratios of CDIs to acceptable daily intakes (reference doses) for all chemicals and intake routes for a given human receptor.

## B. Risk Summary

A current potential groundwater use for each private well was evaluated for ingestion of drinking water. A chronic hazard index of 1.91 was estimated for PW01. Lead (1.88), copper (.01), and zinc (.02) were associated with this risk. These contaminants may be associated with the type of plumbing used, rather than site related contaminants. PW02 and PW03 both had chronic hazard indices less than one.

Excess cancer risk for current potential groundwater use from PW02 was zero because no carcinogens were detected. The estimated excess lifetime cancer risks for PW01 ( $7.84 \times 10^{-5}$ ) and PW03 ( $2 \times 10^{-6}$ ) were within the EPA range of concern of  $10^{-6}$  and  $10^{-4}$ .

The future exposure scenario included residential groundwater use. Only exposure to groundwater was assessed under the future residential scenario. A chronic hazard index of 17.6 was estimated for potential future residential use of groundwater. This indicated a potential noncarcinogenic health risk for this hypothetical scenario. Trichloroethene in groundwater accounted for approximately 79 percent of this noncarcinogenic risk. Both toluene and N-nitrosodiphenylamine accounted for approximately 11 percent.

Excess cancer risk for potential future residential groundwater use was estimated at  $3 \times 10^{-3}$ . Vinyl chloride ( $8 \times 10^{-4}$ ), trichloroethene ( $8 \times 10^{-4}$ ), 1,1-dichloroethene ( $3 \times 10^{-4}$ ), and Arsenic ( $3 \times 10^{-4}$ )



accounted for the majority of this excess cancer risk.

The OCI site poses an imminent and substantial endangerment to public health, welfare or the environment. Implementation of the selected remedy should stop further migration of the contaminant plume, achieving significant risk reduction while a final solution is being developed.

## VII. Description of Alternatives

By combining selected technologies, four alternatives were developed for this interim action to address the contaminated groundwater in the UGS. The four alternatives developed for this interim action are:

- Alternative 1 -- no action;
- Alternative 2 -- source containment, groundwater monitoring, and land use and deed restrictions;
- Alternative 3 -- groundwater collection, groundwater monitoring, UV/oxidation, activated sludge and discharge;
- Alternative 4 -- groundwater collection, groundwater monitoring, granular activated carbon (GAC), air stripping and discharge.

### A. Alternative 1 -- No Action

The no action alternative is required by the National Contingency Plan (NCP). Under the no action alternative, the site is left "as is" and no funds are expended for monitoring, control or cleanup of contamination associated with the OCI site. This alternative serves as a baseline for comparison with the other alternatives.

The capital and present worth cost for this alternative is \$0.

### B. Alternative 2 -- Source Containment, Groundwater Monitoring, and Institutional Controls

Alternative 2 includes the construction of a multi-media RCRA Subtitle C cap above the former seepage lagoon, groundwater monitoring and land use and deed restrictions.

The multi-media RCRA Subtitle C cap from bottom to top would consist of compacted clay, a synthetic membrane, a drainage layer, compacted native soil, top soil and a vegetative layer. A cross-section of the cap is shown on Figure 14. The cap would be 120 feet long and 120 feet wide.

A monitoring well sampling program would be initiated to determine the effectiveness of the multi-media RCRA cap in reducing contaminated leachate from entering groundwater. This

alternative should be designed and constructed within a year to eighteen months.

Institutional controls, such as land use and deed restrictions would also be applied to the site. The objectives of these restrictions are to prevent exposure to harmful contaminants in the groundwater and the former seepage lagoon and to control future development or excavation at the site.

The capital cost of this alternative is \$95,000 with O&M of \$27,000. The present worth cost is \$510,000.

### C. Alternative 3 -- Groundwater Monitoring, Groundwater Collection, UV/Oxidation Activated Sludge and Discharge

Alternative 3 includes groundwater monitoring, groundwater collection, UV/Oxidation, activated sludge treatment and discharge of treated water to the Grand River.

A monitoring well sampling program would be initiated to determine the effectiveness of the groundwater extraction system in reducing contaminated groundwater from entering the LGS. This alternative could be designed and constructed within a year to eighteen months.

Based on the groundwater extraction schemes developed, approximately 40 gpm of water would be extracted from three extraction wells on site. Following extraction, the contaminated groundwater would be pumped through a pipe network to an onsite groundwater treatment facility. The treatment system would consist of an equalization basin, a UV/Oxidation reactor, an activated sludge unit, and a multi-media filter. After the first five years of remedial action, the activated sludge unit and multi-media filter will be replaced by a GAC unit. This change is necessary because of an expected decrease in influent BOD after five years of pumping.

The treatment facility will be located on the OCI property approximately 150 feet north of the OCI office building. Following treatment, water would travel by gravity flow approximately 5,000 feet north of the treatment facility to the Grand River. Figure 15 illustrates the preliminary locations of the extraction wells, the piping routes, the groundwater treatment facility and the Grand River discharge point.

It should be noted that the activated sludge process was chosen as an applicable and representative biological treatment process so that the cost to implement Alternative 3 might be estimated. The final biological treatment process would be selected during remedial design as part of a treatability study during the design of this system.

Action-specific Applicable or Relevant and Appropriate Requirements (ARAR)s which are applicable for the site pertain to the construction of the groundwater collection system and treatment process, the treatment and subsequent discharge of the treated groundwater, and the management of treatment residuals in accordance with the Land Disposal Restriction (LDR) requirements of RCRA, as these residuals would contain listed hazardous wastes. The

groundwater would be treated to surface water quality standards for organic and inorganic contaminants before being discharged to the Grand River.

The capital cost is \$1,323,000 with O&M of \$291,000. The present worth cost is \$5,787,000.

#### Alternative 4 -Groundwater Monitoring, Groundwater Collection, Granular Activated Carbon (GAC) Air Stripping and Discharge

Alternative 4 includes groundwater monitoring, groundwater collection, GAC treatment followed by Air Stripping and discharge of treated water to the Grand River.

A monitoring well sampling program would be initiated to determine the effectiveness of the groundwater extraction system in reducing contaminated groundwater from entering the LGS. This alternative could be designed and constructed within a year to eighteen months.

The groundwater extraction schemes for this alternative are the same as alternative 3. Following extraction, the contaminated groundwater would be pumped through a pipe network to an onsite groundwater treatment facility. The treatment system would consist of an equalization/sedimentation basin, two GAC vessels and an air stripper. The majority of volatile organic compounds would be removed in the GAC vessels. The air stripper would be used only as a polishing unit. Therefore, off-gas vapor control is not expected to be needed. The discharges from the air stripper will meet the requirements of state code MAC R336.1701-.1702. The residual GAC from this treatment process would be properly treated in accordance with LDR requirements and disposed of off-site at a RCRA permitted landfill because it will contain listed hazardous wastes. If the residual GAC is regenerated it must be done in a RCRA permitted treatment unit which is in compliance with 40 CFR Part 264 Subpart X. Following treatment, water will be pumped to the Grand River located approximately 5,000 feet north of the facility. Actual discharge limits would be established in accordance with the requirements of the Clean Water Act (CWA) NPDES program. A treatability study during predesign is necessary for the proper design of this system.

The capital cost is \$1,065,000 and the O&M cost is \$317,000. Present worth cost is \$5,931,000.

### VII. Comparative Analysis of Alternatives

In order to determine the most appropriate alternative for the OCI site, the alternatives were evaluated against each other. Comparisons were based on the nine evaluation criteria.

The nine criteria are: 1) overall protection of human health and the environment, 2) compliance with applicable or relevant and appropriate requirements, 3) long-term effectiveness and permanence, 4) reduction of toxicity, mobility, and volume, through treatment, 5) short-term effectiveness, 6) implementability, 7) cost, 8) state acceptance, and 9) community acceptance. However, due to the limited scope of this interim action, as discussed below, certain of these criteria are not relevant in selecting the appropriate alternative.

#### A. Overall Protection of Human Health and the Environment

All of the remedial alternatives considered for the OCI site are protective of human health and the environment by eliminating, reducing, or controlling risks at the OCI site with the exception of the no action alternative. As the no action alternative does not provide protection of human health and the environment, it is not eligible for selection and shall not be discussed further. Alternative 2 would reduce infiltration through the highly contaminated material at the site although it would provide minimal control of contaminant migration in the groundwater. Alternatives 3 and 4 would gradually remove contaminants, thereby reducing the risks from ingestion and further off-site migration.

#### B. Compliance With ARARs

Each alternative is evaluated for compliance with ARARS, including chemical specific, action specific, and location specific ARARS. The alternatives presented for the interim action will comply with those standards that are associated within the limited scope of this interim action. In accordance with Section 121(d)(4) of CERCLA, this remedial action is only part of a total remedial action and will attain the ARAR with regard to ground-water cleanup upon completion. The final response action will attain all ARARs unless a waiver is invoked.

The following are ARARs that the alternatives would comply with: for alternative 2, RCRA Subtitle C for the construction of the cap; for alternatives 3 and 4, RCRA 40 CFR Part 264 Subpart J for the construction and operation of the sedimentation and equalization basin; for alternatives 3 and 4 the Clean Water Act for discharge to the Grand River and state code MAC R336.1701-.1702 for discharges to the air; spent carbon if land disposed will comply with treatment standards of 40 CFR 268.41 and, if regenerated, 40 CFR Part 264 Subpart X.

#### C. Long-Term Effectiveness and Permanence

This criterion is not applicable because this interim action is designed to protect human health and the environment while longer term measures are being determined.

#### D. Reduction of Toxicity, Mobility, or Volume (TMV) Through Treatment

This evaluation addresses the statutory preference for selecting remedial actions that employ treatment technologies which permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances. This preference is satisfied when treatment is used to reduce the principal threats at a site through destruction of toxic contaminants, irreversible reduction of contaminant mobility, or reduction of total volume of contaminated media.

Alternative 2 will not reduce the toxicity, mobility, or volume through treatment. Alternative 3, by removing and treating the groundwater with physical and biological treatment, will reduce the toxicity and the mobility of the groundwater plume as well as the volume of the plume.

The toxicity, mobility, and volume of the contaminated material will not be reduced by Alternative 4 by treatment if the residual carbon is land disposed because the contaminants will only be transferred to the residual carbon and the air by the air stripper. If the residual carbon is regenerated, which will likely be more cost-effective than the toxicity, mobility, and volume of the contaminated material will be reduced by treatment.

#### E. Short-Term Effectiveness

This evaluation focuses on the effects to human health and the environment which may occur while the alternative is being implemented and until the remedial objectives are met. The following factors were used to evaluate the short term effectiveness of each alternative: protection of the community during remedial actions, protection of workers during remedial actions, environmental impacts from implementation of alternatives, and time until remedial objectives are met.

Construction operations associated with Alternatives 2, 3, and 4 will produce minimal disturbance to the surrounding community.

With regard to the time until remedial objectives are met, Alternative 2 should take a few weeks to a few months to implement. Alternatives 3 and 4 will be operated until the final remedial alternative is selected for the site, which is not expected to exceed 5 years. With regard to environmental impacts, alternatives 3 and 4 may result in a change in groundwater flow and will have to be monitored so that no adverse impacts result in the potential wetland areas on the opposite side of I-196. Also, alternative 3 relies on a biological system to treat contaminants that is subject to upsets resulting in occasional exceedances of discharge requirements. Alternative 4 is a physical-chemical system that will not be subject to these upsets.

None of these alternatives will result in unacceptable short-term risks to workers, residents, or the environment.

#### F. Implementability

This evaluation addresses the technical and administrative feasibility of implementing the alternatives and the availability of the various services and materials required during its implementation.

Alternative 2, capping, is well demonstrated and commercially available. Alternatives 3 and 4 are proven technologies and are commercially available.

Administratively, none of the alternatives should have any problem with regard to implementation, although sludge from the alternative 3 treatment process will be considered a hazardous waste because the groundwater was contaminated as a result of improper discharges of F001 through F005 wastes from the OCI facility. The sludge will have to be delisted before

it could be considered a non-hazardous waste or treated in accordance with LDRs prior to disposal.

#### G. Cost

This evaluation examines the estimated costs for implementing the remedial alternatives. Capital and O&M cost are used to calculate estimated present worth costs for each alternative.

Alternative 2 has a capital cost of \$95,000 and an O&M cost of \$27,000. Total present worth is \$510,000. Alternatives 3 and 4 are very similar with regard to meeting the remedial objectives, alternative 3 has slightly less present worth cost of \$5,787,000 while alternative 4 has a present worth cost of \$5,931,000. The capital and O&M for alternative 3 were \$1,323,000 and \$291,000 respectively. The capital and O&M costs for alternative 4 were \$1,065,000 and \$317,000 respectively. The present worth cost of alternative 2 is significantly less than 3 and 4 but it fails to meet the remedial objective of halting contaminant plume migration. Alternatives 3 and 4 present worth cost are very close to each other.

#### H. State Acceptance

The State of Michigan concurs with EPA's selection of alternative 4 for the interim action at the OCI site.

#### I. Community Acceptance

Community response to the alternatives is presented in the responsiveness summary, which addresses comments received during the public comment period.

### IX. The Selected Remedy

After considering the requirements of CERCLA, the detailed analysis of alternatives, and public comments, EPA has selected Alternative 4 for the interim action at OCI:

Alternative 4 - Install, operate and maintain an interim ground water extraction system in the upper ground-water system consisting of, at a minimum, three extraction wells. Install, operate and maintain a ground-water physical-chemical treatment system for the interim ground-water action.

A treatability study along with a pump test will be performed as part of design to determine the proper treatment train and pumping rates. Ground water will be properly treated to comply with NPDES discharge limitations. The residuals from this treatment process will be treated in accordance with LDRs and properly disposed off-site at a RCRA permitted landfill or regenerated in a RCRA permitted treatment unit which is in compliance with 40 CFR Part 264 Subpart X because the residuals will contain listed hazardous wastes.

The primary goal of this interim action is to stop contaminant plume migration thereby reducing threats to public health and the environment.

The capital cost is \$1,065,000 and the O&M cost is \$317,000. Present worth cost is \$5,931,000.

#### **X. Statutory Determinations**

The selected remedy must satisfy the requirements of Section 121(a-e) of CERCLA to:

- A. Protect human health and the environment;
- B. Comply with ARARs;
- C. Be cost-effective;
- D. Utilize permanent solutions and alternate treatment technologies to the maximum extent practicable; and,
- E. Satisfy a preference for treatment as a principle element of the remedy.

The implementation of Alternative 4 at the OCI site satisfies the requirements of CERCLA as detailed below:

#### **A. Protection of Human Health and the Environment**

Implementation of the selected alternative will reduce and control potential risks to human health and the environment by halting the flow of the contaminant plume off the site. With regard to the community and onsite workers, the selected alternative will provide minimal disturbance and therefore minimal risk to the community and onsite workers.

Protection of human health and the environment will be achieved by future response actions that further address contaminated groundwater and soil.

#### **B. Compliance With ARARS**

The selected interim action will comply with those ARARs that are pertinent, given the limited scope of this action. The ARARs for the interim action are listed below.

##### **B.1 Chemical-specific ARARS**

Chemical-specific ARARs regulate the release to the environment of specific substances having certain chemical characteristics. Chemical-specific ARARs typically determine the extent of cleanup at a site.

### B.1.a Groundwater

In accordance with Section 121(d)(4) of CERCLA, this remedial action is only part of a total remedial action and will attain the ARAR with regard to ground-water cleanup upon completion of future response actions.

### B.1.b Surface Water

#### i. State ARARs

Section 303 of the CWA requires the State to promulgate state water quality standards for surface water bodies, based on the designated uses of the surface water bodies. CERCLA remedial actions involving surface water bodies must ensure that applicable or relevant and appropriate state water quality standards are met. The standards established pursuant to R323.2102-.2189 of the Michigan Water Resources Commission Act, Public Act 245 of 1929, as amended, would be applicable to this site. The Grand River near the OCI site is designated a cold water fishery.

### B.2 Location-specific ARARs

Location-specific ARARs are those requirements that relate to the geographical position of a site.

#### i. Federal ARARs

Executive Order 11990 - Protection of Wetlands is an applicable requirement to protect against the loss or degradation of wetlands. As discussed above, Alternative 4 should be designed not to have an adverse effect on wetland areas on the opposite side of I-196.

#### ii. State ARARs

The Goemaere-Anderson Wetland Protection Act of 1979 (Act 203) regulates any activity which may take place in wetlands in the State of Michigan. As discussed above the selected alternative should be designed to not adversely effect wetland areas.

### B.3 Action-specific ARARs

Action-specific ARARs are requirements that define acceptable treatment and disposal procedures for hazardous substances.

#### i. Federal and State RCRA ARARs

The substantive requirements of RCRA waste generation and temporary storage regulations under 40 CFR Part 262 and MAC R299.9601-.11107 are applicable when managing the treatment residuals from the ground water system (e.g., residual carbon). Also, Federal and



State RCRA LDRs governing off site disposal are applicable to the disposal of treatment residuals.

ii. State ARARS

The State is authorized to implement the National Pollutant Discharge Elimination System (NPDES) program. The requirements of a Michigan Pollutant Discharge Elimination System (MPDES) permit, under MAC R323.2102-.2189 would be applied to the discharge of the treated water into the Grand River. Subject to the approval of the U.S. EPA, effluent limits for surface water discharge will be established by the MDNR.

MAC R336.1701-.1702 regulates air emissions from treatment technologies and is applicable to point source emissions from industrial facilities. Because air strippers may emit hazardous substances in the form of VOCs, this section is applicable to the remedy. The need for emission control technology shall be evaluated based on requirements of this section. If air stripper emissions are projected to exceed standards at the OCI property boundary, the point of compliance, then vapor control technology such as vapor phase activated carbon will be included in the treatment system to bring air emissions into compliance.

Additional action-specific ARARSs are found in the FS.

C. Cost-effectiveness

EPA believes the selected remedy is cost-effective in preventing the migration of contaminated ground water at the site. Cost-effectiveness compares the effectiveness of an alternative in proportion to its cost of providing its environmental benefits. Alternative 2 was the least costly of the three alternatives but failed to meet the objective of the remedial action of stopping further migration of the contaminant plume. Alternatives 3 and 4 both met the remedial action objectives and cost relatively the same. Alternative 3 is more effective with regard to the reduction of TMV only if the residuals from alternative 4 are land disposed. If the residuals from alternative 4 are regenerated, alternative 4 has the same reduction of TMV through treatment. Alternative 4 has significantly greater performance with regard to short-term effectiveness. Alternative 4 provides overall effectiveness proportional to its cost and represents a reasonable value.

D. Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

EPA and the State of Michigan believe the selected remedy for the OCI Site represent the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the interim action. The Alternative represents the best balance of tradeoffs among the alternatives with respect to the pertinent criteria given the limited scope of the action. (see above).

**E. Preference for Treatment as a Principal Element**

**This preference will be addressed in the final decision document for this site.**

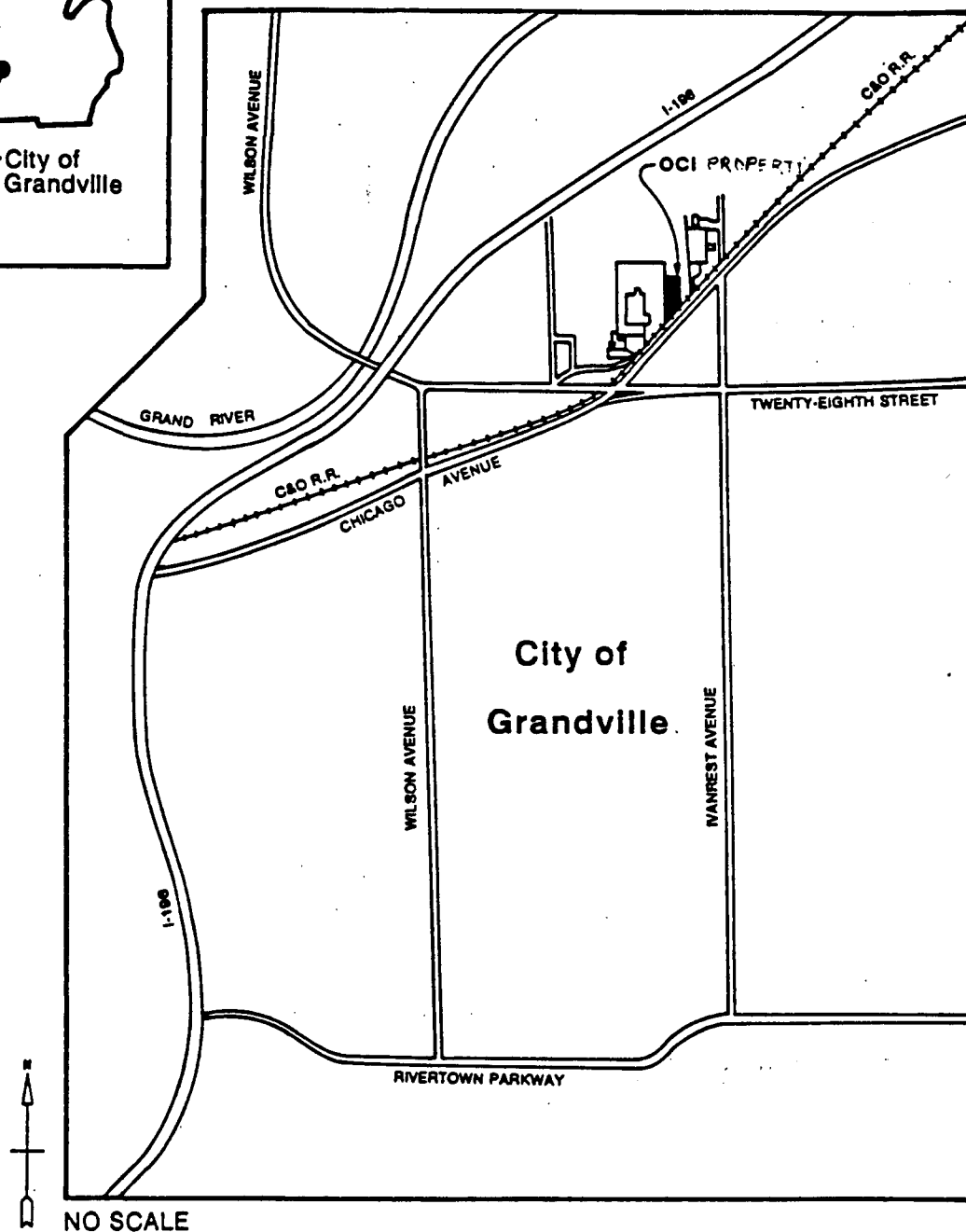
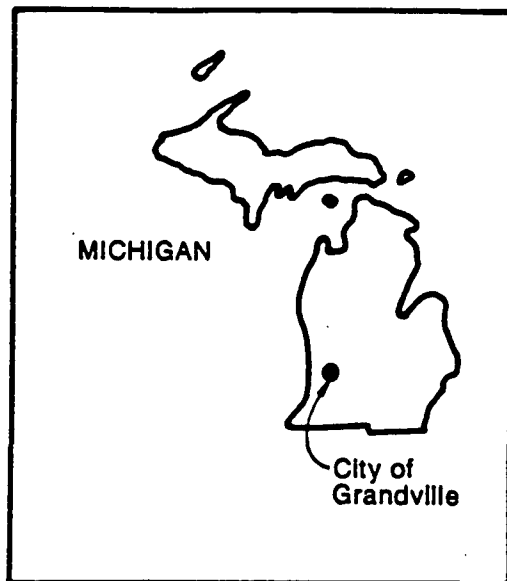


FIGURE 1  
OCI SITE LOCATION MAP  
ORGANIC CHEMICALS, INC. SITE

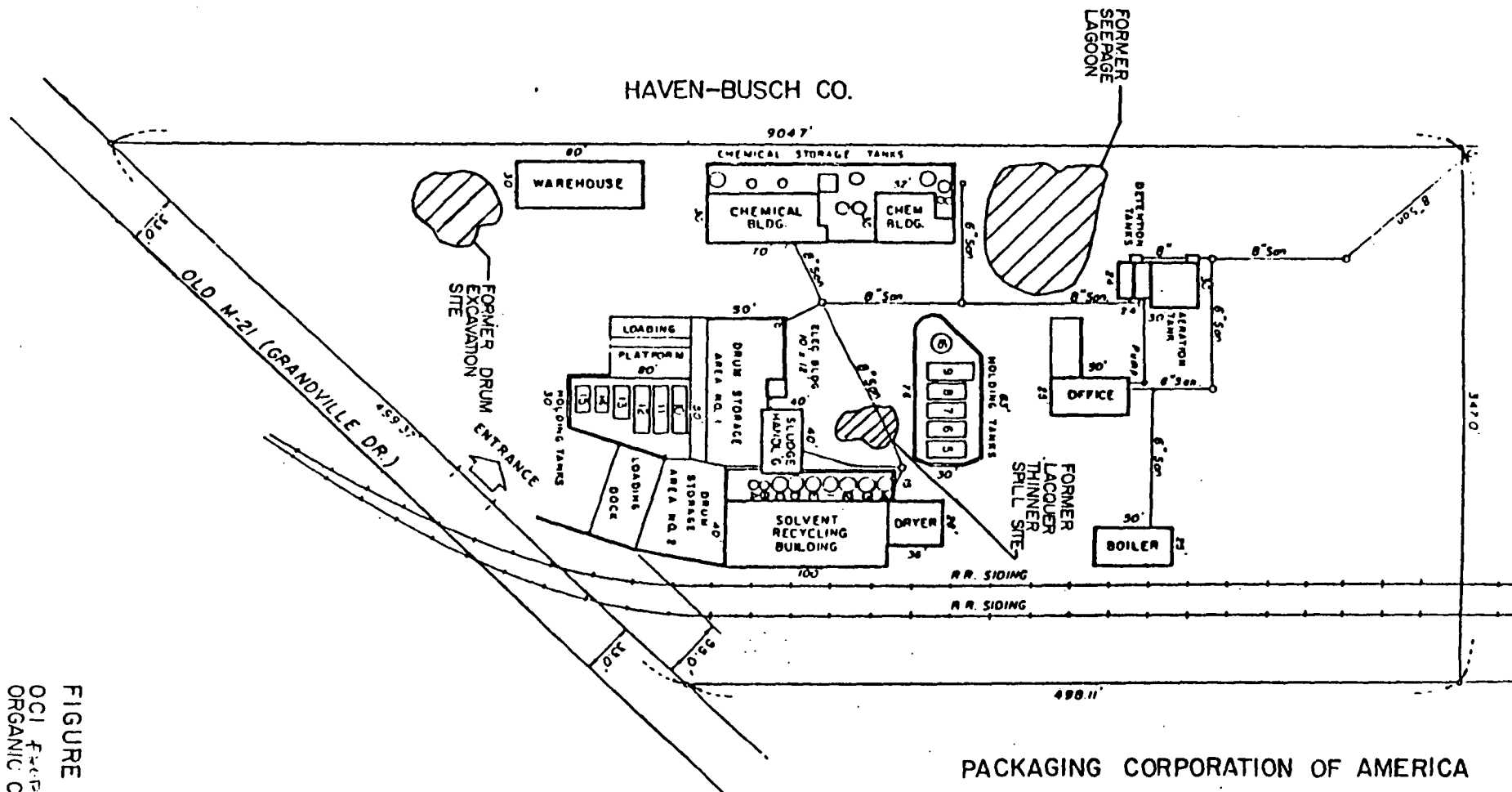


FIGURE 2  
OCI FACILITY DETAIL  
ORGANIC CHEMICALS INF. SITE



FIGURE 3  
SOURCE AREAS  
ORGANIC CHEMICALS, INC. SITE





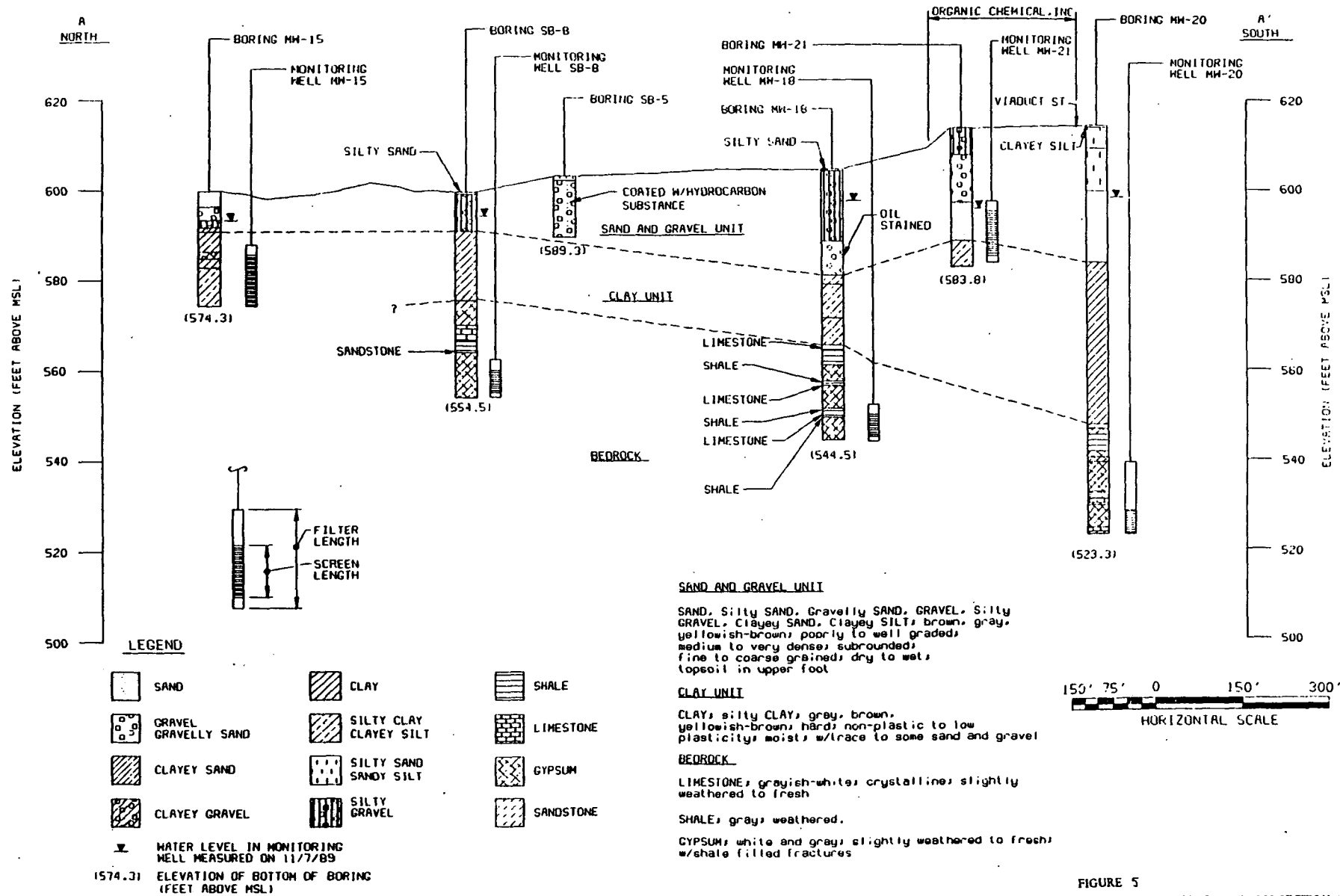
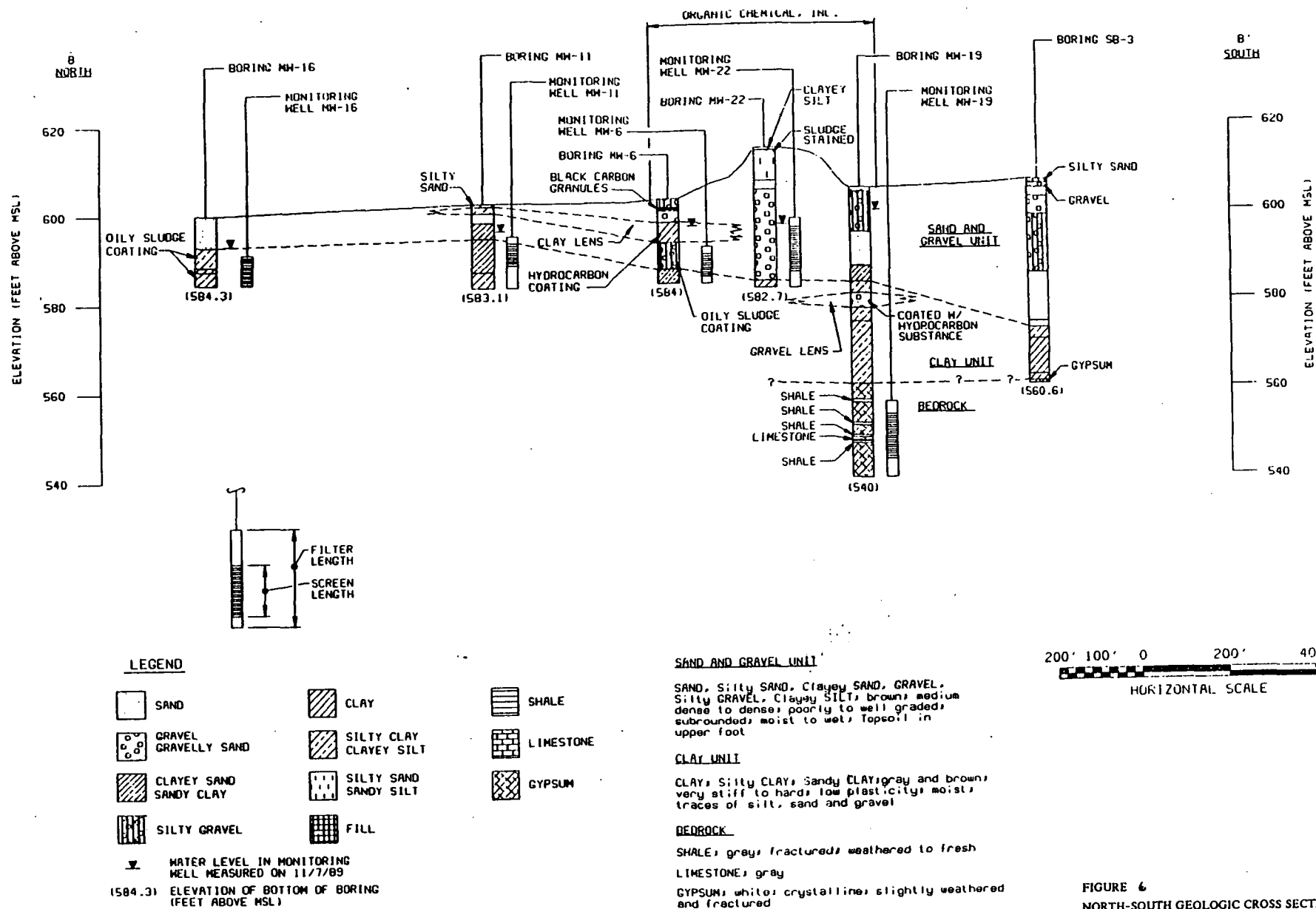


FIGURE 5  
NORTH-SOUTH GEOLOGIC CROSS SECTION A-A'  
ORGANIC CHEMICALS, INC. SITE

CAD DWG NO: C0000329  
DATE: 02-15-91 MLEE  
PLOT SCALE: 1"=1'



CAO, DMC NO: C0000320  
 DATE: 02-15-91, HLEE  
 PLOT SCALE: 1"=1'



CAD DWG NO: C0000231  
DATE: 01-30-00  
PLOT SCALE: 1"=1'

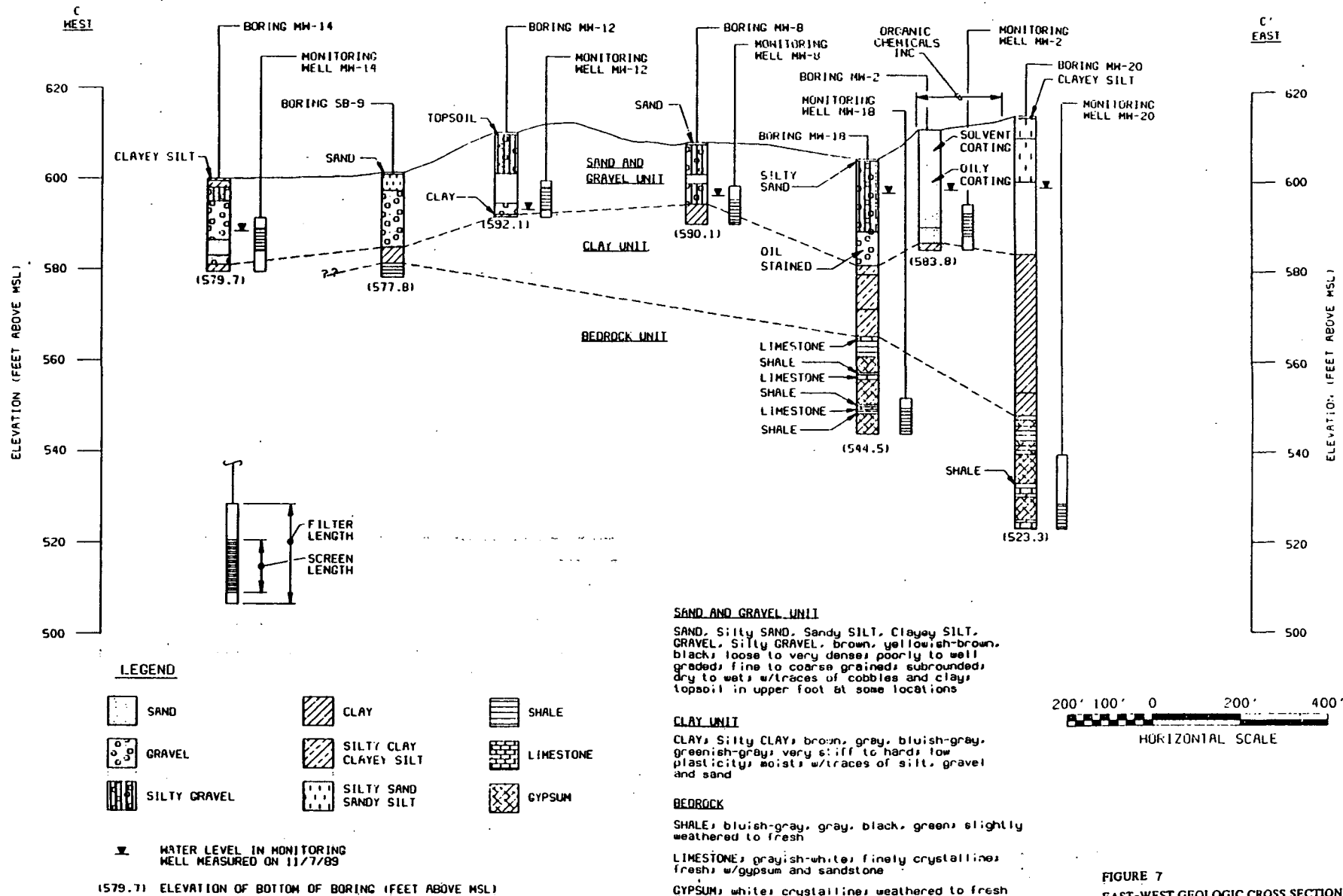
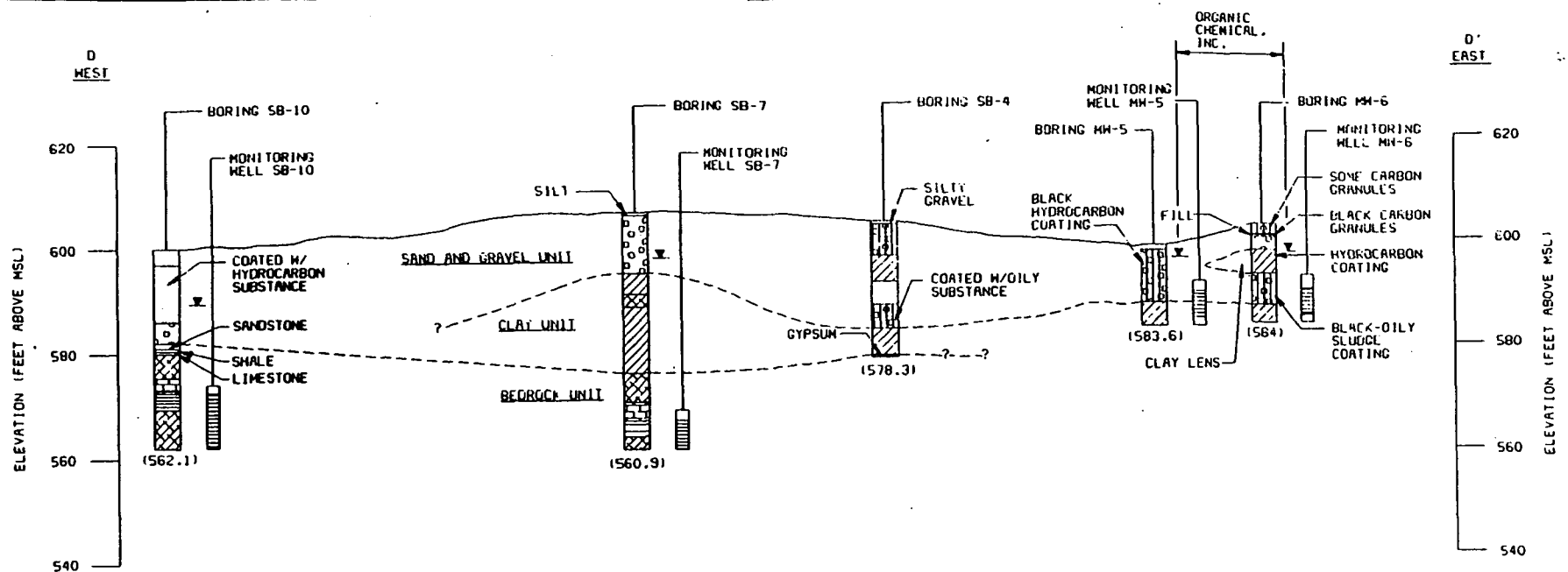


FIGURE 7  
EAST-WEST GEOLOGIC CROSS SECTION C-C'  
ORGANIC CHEMICALS, INC. SITE



#### LEGEND


WATER LEVEL IN MONITORING WELL MEASURED ON 11/7/89  
 (562.1) ELEVATION OF BOTTOM OF BORING (FEET ABOVE MSL)

#### SAND AND GRAVEL UNIT

SAND, Silty Sand, Clayey Sand, GRAVEL, Silty GRAVEL, SILT, brown and black, loose to medium dense, poorly to well graded, fine to coarse grained, subrounded, dry, moist and wet w/ traces of clay, silt, cobbles and fill; topsoil in upper foot.

#### CLAY UNIT

CLAY, Silty CLAY, brown, gray, bluish-gray, very stiff to hard, low to high plasticity, moist, w/ traces of sand, gravel and gypsum.

#### BEDROCK UNIT

SHALE, gray, dark-gray, fractured.

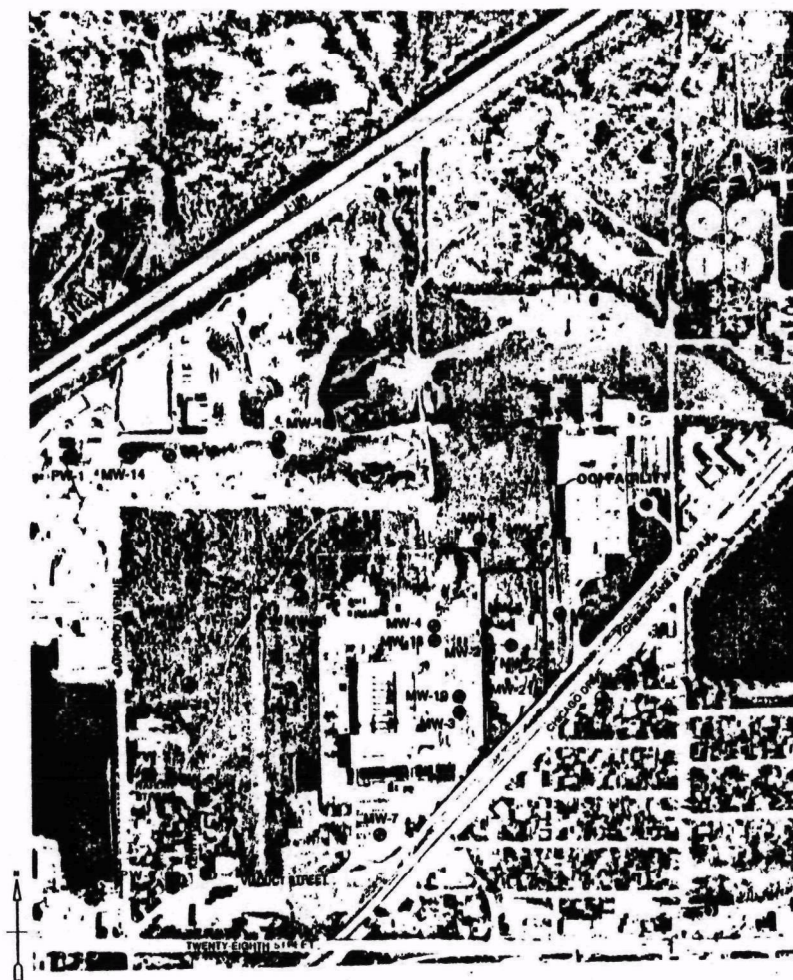
LIMESTONE, shaley, gray, crystalline, w/ sandstone lens.

GYPSUM, white, pink, crystalline, weathered.

FIGURE 8

EAST-WEST GEOLOGIC CROSS SECTION D-D'  
ORGANIC CHEMICALS, INC. SITE

CAD DMC NO: C0000332  
 DATE: 10-1-90 MLEE  
 PLOT SCALE: 1"=1'

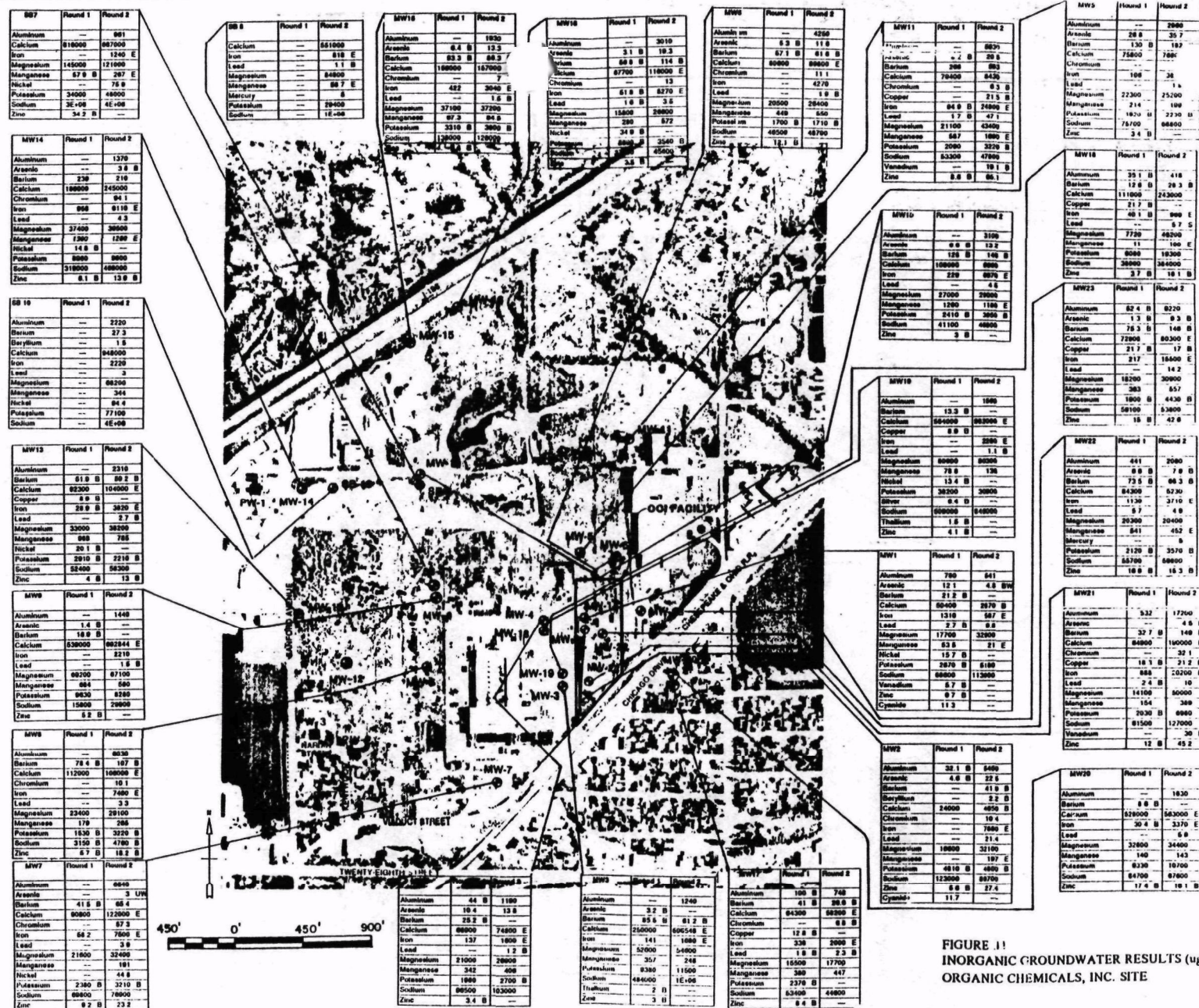


- - PRIVATE WELL
- - SOIL BORING
- - MONITORING WELL

450' 0' 450' 900'

FIGURE 9  
MONITORING WELL LOCATIONS  
ORGANIC CHEMICALS, INC. SITE





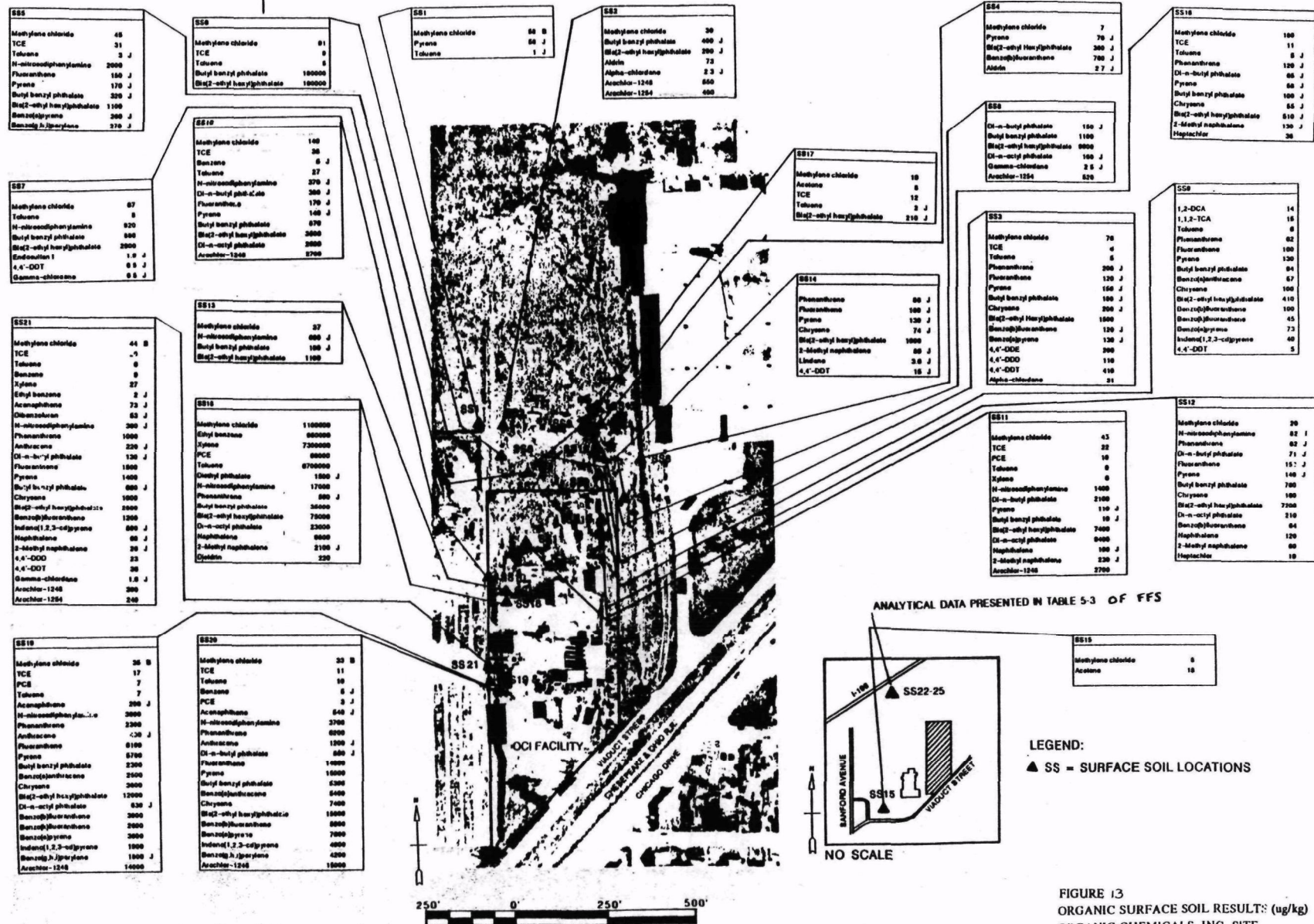












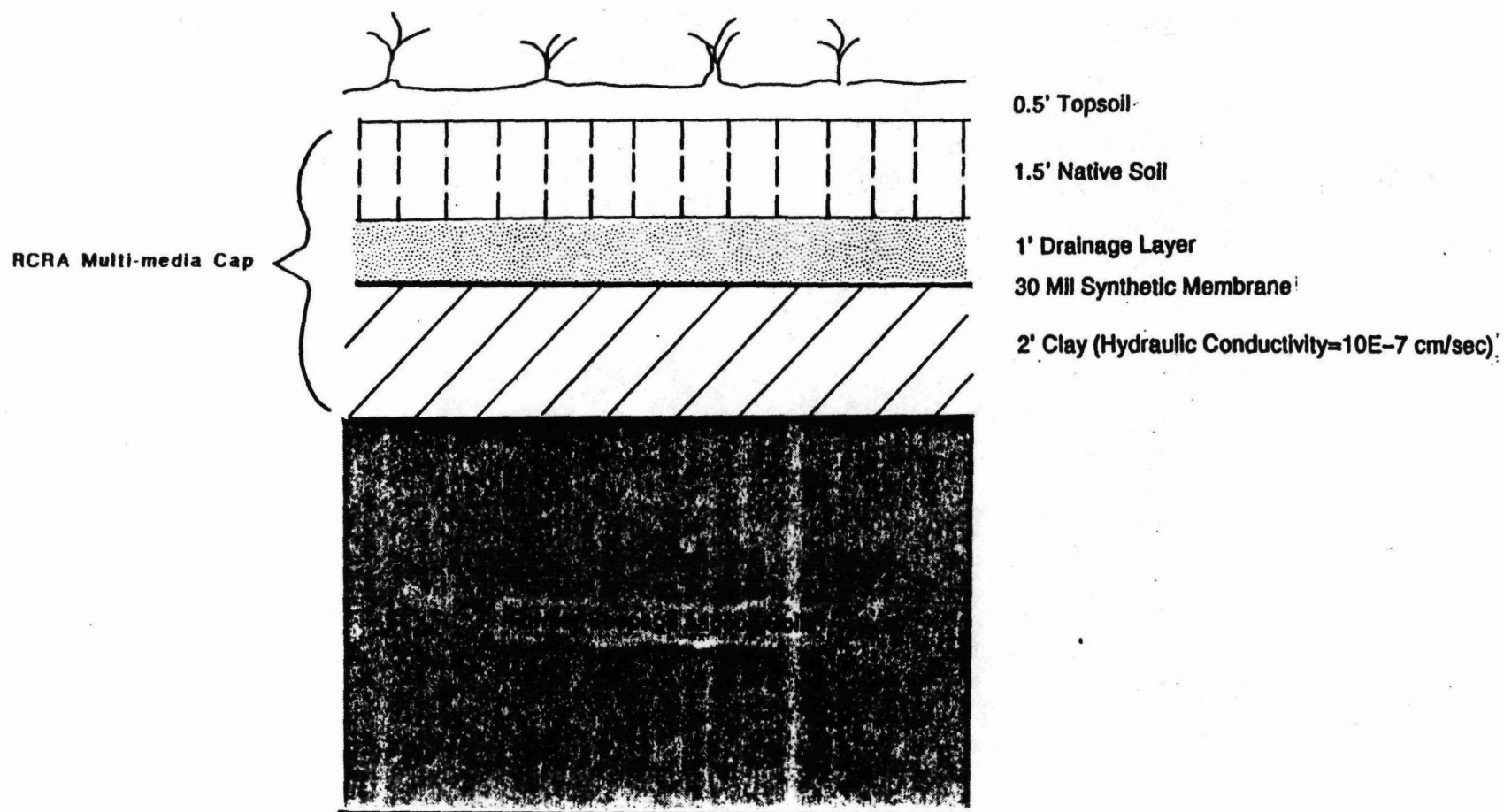


FIGURE 14  
CROSS-SECTION OF MULTI MEDIA RCRA CAP  
ORGANIC CHEMICALS, INC. SITE



DISCHARGE TO GRAND RIVER (2300 FT)



LEGEND:

- EXTRACTION WELL
- PIPING
- ▨ GROUNDWATER TREATMENT FACILITY

FIGURE 15  
ALTERNATIVE 3 & 4: EXTRACTION WELLS, PIPING  
ROUTES AND TREATMENT FACILITY LOCATIONS  
ORGANIC CHEMICALS, INC. SITE

TABLE 1  
PHYSICAL/CHEMICAL PARAMETERS FOR GROUNDWATER  
ROUND 1

ANALYTE										
SAMPLE LOCATION	TDS (mg/l)	TSS (mg/l)	COD (mg/l)	TOC (mg/l)	TOX (ug/L)	BOD (mg/l)	ALKALINITY (mg/l)	pH	Specific Conductivity (umhos)	Temp (C)
MW 1	636	1380J*	464J	10.0*	826J*	90J*	349J	6.88	930	17.1
MW 2	719	852J*	432J	18.6*	14000J*	15.7J*	369J	6.91	804	14.3
MW 3	2760	6130J	272J	3.0J*	26.0J*	22.5J*	190J	--	--	--
MW 4	580	1590J	35.3J*	3.5J*	80J*	7.9J*	322J	--	--	--
MW 4D	720	1190J	80.0J*	3.5J*	116J*	4.1J*	287J	--	--	--
MW 5	628	1860J	66.9J*	4.1J*	58.0J*	4.7J*	284J	--	--	--
MW 6	600J	1470J	113J*	2.7*	20.85J*	6.4J*	300J	6.95	640	13.7
MW 7	616	64.5J	26.4J	2UJ*	16.0J*	2.1J*	237J	--	--	--
MW 8	487	3500J*	76.0J	2.1J*	13.8J*	2UJ*	886J	6.5	668	16
MW 9	2530	2050J*	144J	4.6*	25.4J*	2UJ*	363J	6.97	2000	13.4
MW 10	596	8960J*	276J	3.6J*	25.6*	4.1J*	601J	6.74	755	18.5
MW 11	633J*	12700J*	2840J	8.9*	33.6*	79.2J*	534J	6.9	700	15.4
MW 11D	640J*	9970J*	2640J	8.3*	38.4J*	35.2J*	606J	--	--	--
MW 13	716	2000J*	184J	7.3J*	75.0*	2UJ*	3.7J	6.73	843	14.2
MW 14	1650	31.0J*	63.4J*	5.5J*	27.4J*	4.0J*	346J	--	--	--
MW 15	1200	965J	268J	2UJ*	11J*	2UJ*	275J	6.78	1564	16.1
MW 15D	1140	792J	59.8	2UJ*	5U*	4.0J*	288J	--	--	--
MW 16	750	16500J*	184J	32.1J*	37.2*	45.4J*	496J	--	--	--
MW 17	379	224J	31.2J	2UJ*	15.2J*	4.0J*	245J	7.6	599	16.8
MW 18 **	1130	1280J*	336J	25.8J*	26.9*	91.0J*	272J	6.81	580	17.8
MW 19 **	4190	258J	268J	4.5J*	20.7J*	57.0J*	161J	--	--	--
MW 20 **	2610J	45.5J	66.9J*	2U*	118*	4.8J*	164J	6.9	1040	13.8
MW 21	845	10100J	328J	2.2UJ*	15.8J*	2.5J*	202J	--	--	--
MW 22	580J*	2500J*	280J	5.3*	182J*	10J*	226J	6.9	865	14.7
MW 23	470	1410J	190J*	2UJ*	22.6J*	9.8J*	240J	7.7	669	16.8
SB 7 **	12300J*	299J*	928J*	2U*	27.8J*	2UJ*	132J	6.91	6180	11.1
SB 8 **	5630J*	74.5J*	313J*	2U*	28.8J*	3.4J*	105J	6.26	5270	11.8
PW01	1130	8.5J	5U	2U	24.7J	2UJ	190J	--	--	--
PW02	1560	12.5J	5.4J	2U	17.2J	2UJ	138J	--	--	--
PW03	787	2U	5U	2U	7.9J	2UJ	192J	--	--	--

NOTE:

J = ESTIMATED

U = UNDETECTED

\* = RESAMPLING DATA TO FOLLOW

D = DUPLICATE

-- = NOT TESTED OR ANALYZED

\*\* = LGS MONITORING WELLS

SB-10 \*\* WAS NOT SAMPLED DURING ROUND 1  
GROUNDWATER SAMPLING

TDS = TOTAL DISSOLVED SOLIDS

TSS = TOTAL SUSPENDED SOLIDS

COD = CHEMICAL OXYGEN DEMAND

TOC = TOTAL ORGANIC CARBON

TOX = TOTAL ORGANIC HALIDE

BOD = BIOCHEMICAL OXYGEN DEMAND

TABLE 2  
PHYSICAL/CHEMICAL PARAMETERS FOR GROUNDWATER  
ROUND 2

SAMPLE LOCATION	ANALYTE								Specific Conductivity (umhos)	Temp (c)
	TDS (mg/l)	TSS (mg/l)	COD (mg/l)	TOC (mg/l)	TOX (ug/L)	BOD (mg/l)	ALKALINITY (mg/l)	pH		
MW 1	617J	1070J*	321J	16J*	--	63J*	430J	7.3	820	14
MW 2	587J	1660J*	159J	6.1J*	--	19J*	313J	7.87	770	13
MW 3	2960J	18500	242J	1.7J*	6.7*	21J*	1890J	7.04	1350	11
MW 4	640J	502J	27J*	3J*	--	6J*	287J	7.03	900	12
MW 5	468J	720	37J*	3.7J*	45*	5J*	285J	7.58	610	11
MW 6	470J	1140	44J*	3.1J*	5U*	5J*	299J	7.52	648	11
MW 6D	460J	2450	79J*	3.2J*	5U*	5J*	331J	--	--	--
MW 7	628J	1170	44J	3J*	12*	5J*	271J	6.93	888	12
MW 8	445J	2340J*	56J	1.1J*	6.7*	2UJ*	432J	7.3	486	12
MW 8D	397J	2080J*	52J	58J*	--	2UJ*	436J	--	--	--
MW 9	2450J	2730J*	91J	2.8J*	20*	4J*	285J	7.32	1910	10
MW 10	504J	904J*	25J	2.8J*	--	4J*	380J	9.2	700	11
MW 11	400J*	25100J*	474J	76J*	--	18J*	590J	7.38	623	13
MW 13	693J	5290J*	75J	3J*	25*	2UJ*	343J	7.11	610	10
MW 14	1670J	458J*	33J*	6.1J*	--	3J*	352J	7.15	2200	12
MW 15	1050J	764	32J	1.5J*	--	2UJ*	271J	7.35	1230	11
MW 16	540J	945J*	179J	24J*	--	9J*	374J	7.47	670	11
MW 17	380J	165	20J	3.9J*	5U*	3J*	168J	7	593	12
MW 18 **	2840J	292J*	222J	57J*	--	117J*	127J	7.6	2420	11
MW 19 **	4350J	1270	91J	2.5J*	5U*	6J*	249J	7.44	4320	11
MW 20 **	2390J	407	37J*	2.7J*	5.2*	13J*	170J	9.14	2100	12
MW 21*	817J	4190	75J	19J*	5U*	4J*	287J	6.76	651	12
MW 21D	693J	5290	83J	29J*	5U*	4J*	333J	--	--	--
MW 22	457J*	660J*	125J	5.7J*	--	14J*	315J	7.33	607	13
MW 23	417J	2040	135J*	43J*	9.7*	12J*	333J	9.39	615	12
SB 7 **	11500J*	179J*	95J*	4.3J*	--	8J*	131J	7.6	12730	9
SB 8 **	5400J*	151J*	139J*	11J*	--	5J*	115J	8.53	5090	11
SB 10 **	11200J*	2470J*	198J*	5.7J*	--	21J*	72J	--	10300	--

NOTE:

J = ESTIMATED

U = UNDETECTED

\* = RESAMPLING DATA TO FOLLOW

D = DUPLICATE

-- = NOT TESTED OR ANALYZED

\*\* = LGS MONITORING WELLS

TDS = TOTAL DISSOLVED SOLIDS

TSS = TOTAL SUSPENDED SOLIDS

COD = CHEMICAL OXYGEN DEMAND

TOC = TOTAL ORGANIC CARBON

TOX = TOTAL ORGANIC HALIDE

BOD = BIOCHEMICAL OXYGEN DEMAND

Table 3

Area of Contamination	Contaminants Found	Estimated Concentrations Found (ug/L)	MCL Level (ug/L)
Upper Ground-Water System	Trichloroethene	6,700	5
	Toluene	12,700	1,000
	Xylene	1,700	10,000
	Monochlorobenzene	300	100
	Vinyl chloride	31	2
	1,1-dichloroethene	42	7
	Arsenic	15	50
	Benzene	105	5
	Bis(2-ethylhexyl) phthalate	7	Not Available

TABLE 4  
SUMMARY OF COMPOUNDS DETECTED

VOLATILE ORGANIC COMPOUND	SURFACE SOIL	SUBSURFACE SOIL *	GROUND WATER
1,1,2,2-Tetrachloroethane		X	
Tetrachloroethene	X	X	X
1,2-Trichloroethene	X	X	
1,1,1-Trichloroethane			X
Trichloroethene	X	X	X
1,2-Dichloroethane	X	X	X
1,2-Dichloroethene		X	X
1,1-Dichloroethane			X
1,1-Dichloroethene			X
Vinyl Chloride			X
Chloroform			X
Benzene	X	X	X
Toluene	X	X	X
Ethyl Benzene	X	X	X
Chlorobenzene		X	X
Styrene		X	X
Xylene (total)	X	X	X
Phenol		X	X
1,2-Dichloropropane			X
2-Hexanone			X
4-Methyl-2-Pentanone			X
2-Butanone		X	
Carbon Disulfide		X	
Acetone	X	X	X
Methylene Chloride	X	X	X

\* Includes compounds detected in test pit soils.

TABLE 4  
SUMMARY OF COMPOUNDS DETECTED

SEMIVOLATILE ORGANIC COMPOUND	SURFACE SOIL	SUBSURFACE SOIL *	GROUND WATER
Acenaphthene	X	X	X
Fluorene		X	X
Phenanthrene	X	X	X
Bis(2-ethyl hexyl) phthalate	X	X	X
Bis(2-chloroethyl) ether			X
Naphthalene	X	X	X
2-Methyl Naphthalene	X	X	X
N-nitroso diphenylamine	X	X	X
Benzyl alcohol			X
2-Methyl phenol		X	X
4-Methyl phenol		X	X
Benzoic Acid			X
Di-n-butyl phthalate	X	X	X
Dibenzofuran	X	X	X
Pentachlorophenol			X
Butyl benzyl phthalate	X	X	X
2,4-Dimethyl phenol			X
2-Chlorophenol			X
Di-n-octyl phthalate	X	X	X
Pyrene	X	X	X
Fluoranthene	X	X	
Benzo(a)anthracene	X	X	
Benzo(a)pyrene		X	
Benzo(b)fluoranthene	X		
Benzo(k)fluoranthene	X		
Indeno(1,2,3-cd)pyrene	X		
Diethyl phthalate	X		
Anthracene	X		
Chrysene	X		
Benzo(g,h,i)perylene	X		

\* Includes compounds detected in test pit soils.

TABLE 4  
SUMMARY OF COMPOUNDS DETECTED

PESTICIDES/PCBS	SURFACE SOIL	SUBSURFACE SOIL *	GROUND WATER
Endosulfan sulfate			X
Aroclor 1242 (PCB)		X	
Aroclor 1248 (PCB)	X	X	
Aroclor 1254 (PCB)	X		
Aldrin	X	X	
4,4-DDD	X	X	
4,4-DDE	X	X	
4,4-DDT	X	X	
Gamma Chlordane	X	X	
Lindane	X	X	
Beta - BHC		X	
Delta - BHC		X	
Alpha Chlordane	X		
Dieldrin	X		
Heptachlor Epoxide	X		
Dioxins	X		

\* Includes compounds detected in test pit soils.

TABLE 4  
SUMMARY OF COMPOUNDS DETECTED

INORGANICS	SURFACE SOIL	SUBSURFACE SOIL *	GROUND WATER
Aluminum	X	X	X
Antimony		X	
Arsenic	X	X	X
Barium	X	X	X
Beryllium	X	X	X
Cadmium	X	X	X
Calcium	X	X	X
Chromium	X	X	X
Cobalt	X	X	X
Copper	X	X	X
Iron	X	X	X
Lead	X	X	X
Magnesium	X	X	X
Manganese	X	X	X
Mercury	X	X	X
Nickel	X	X	X
Potassium	X	X	X
Selenium			X
Silver		X	X
Sodium	X	X	X
Thallium			X
Vanadium	X	X	X
Zinc	X	X	X
Cyanide	X	X	X

\* Includes compounds detected in test pit soils.



**TABLE 5**  
**TOXICITY VALUES FOR CHEMICALS OF CONCERN**

CHEMICALS	INHALATION RfD	INGESTION RfD	REFERENCE	INHALATION SLOPE FACTOR	INGESTION SLOPE FACTOR	WEIGHT OF EVIDENCE	REFERENCE
Vinyl Chloride				2.0E-01	2.3E+00	A	HEAST
Methylene Chloride		6.0E-02	IRIS	1.4E-02	7.5E-03	B2	IRIS
Acetone		1.0E-01	IRIS				
1,1-Dichloroethene		9.0E-03	IRIS	1.2E+00	6.0E-01	C	IRIS
1,1-Dichloroethane	1.0E-01	1.0E-01	HEAST			B2	
1,2-Dichloroethene (total)		1.0E-02	HEAST				
1,2-Dichloroethane				9.1E-02	9.1E-02	B2	IRIS
1,1,1-Trichloroethane		9.0E-02	IRIS				
Trichloroethene		7.3E-03	HEALTH ADV.	1.7E-02	1.1E-02	B2	HEAST
1,1,2-Trichloroethane		4.0E-03	IRIS	5.7E-02	5.7E-02	C	IRIS
Benzene				2.9E-02	2.9E-02	A	IRIS
Tetrachloroethene		1.0E-02	IRIS	3.3E-03	5.1E-02	B2	HEAST
Toluene	2.0E+00	2.0E-01	HEAST/IRIS			D	
Chlorobenzene	5.0E-03	2.0E-02	IRIS				
Ethylbenzene		1.0E-01	IRIS			D	
Xylene (total)	3.0E-01	2.0E+00	HEAST/IRIS			D	
Phenol		6.0E-01	IRIS			D	
bis(2-Chloroethyl)Ether				1.1E+00	1.1E+00	B2	IRIS
Benzyl Alcohol		3.0E-01	HEAST				
2-Methylphenol		5.0E-02	IRIS				
4-Methylphenol		5.0E-02	IRIS				
2,4-Dimethylphenol		2.0E-02	HEAST				
Benzoic Acid		4.0E+00	IRIS				
Naphthalene		4.0E-03	HEAST				
2-Methylnaphthalene		4.0E-03	NAPH			B2	
Acenaphthene		4.0E-03	NAPH				
Dibenzofuran							
Diethylphthalate		8.0E-01	IRIS				
Fluorene		4.0E-03	NAPH				
N-Nitrosodiphenylamine(1)					4.9E-03		IRIS
Phenanthrene		4.0E-03	NAPH				
Anthracene		3.0E-01	IRIS				
Di-n-Butylphthalate		1.0E-01	IRIS				
Fluoranthene		4.0E-02	IRIS				
Pyrene		3.0E-02	IRIS				
Butyl Benzyl Phthalate		2.0E-01	IRIS			C	
Benzo(a)Anthracene		4.0E-03	NAPH		1.2E+01	B2	B(a)P
bis(2-Ethylhexyl)Phthalate		2.0E-02	IRIS		1.4E-02	B2	HEAST
Chrysene		4.0E-03	NAPH		1.2E+01	B2	B(a)P
Di-n-Octyl Phthalate		2.0E-02	HEAST				
Benzo(b)Fluoranthene		4.0E-03	NAPH		1.2E+01	B2	B(a)P
Benzo(k)Fluoranthene		4.0E-03	NAPH		1.2E+01	B2	B(a)P
Benzo(a)Pyrene		4.0E-03	NAPH		1.2E+01	B2	HEAST
Indeno(1,2,3-cd)Pyrene		4.0E-03	NAPH		1.2E+01	B2	B(a)P
Benzo(g,h,i)Perylene		4.0E-03	NAPH		1.2E+01		B(a)P

**TABLE 5**  
**TOXICITY VALUES FOR CHEMICALS OF CONCERN**

CHEMICALS	INHALATION RfD	INGESTION RfD	REFERENCE	INHALATION SLOPE FACTOR	INGESTION SLOPE FACTOR	WEIGHT OF EVIDENCE	REFERENCE
Heptachlor		5.0E-04	IRIS	4.5E+00	4.5E+00	B2	IRIS
Dieldrin		5.0E-05	IRIS	1.6E+01	1.6E+01	B2	IRIS
4,4'-DDD					2.4E-01		IRIS
4,4'-DDT		5.0E-04	IRIS	3.4E-01	3.4E-01	B2	IRIS
Gamma-Chlordane		5.0E-05	IRIS	1.3E+00	1.3E+00	B2	IRIS
Arochlor-1248					7.7E+00	B2	IRIS
Arochlor-1254					7.7E+00	B2	IRIS
Aluminum							
Arsenic		1.0E-03	HEAST	5.0E+01	1.7E+00	A	HEAST/IRIS
Barium	1.0E-04	7.0E-02	IRIS				
Beryllium		5.0E-03	HEAST	8.4E+00	4.3E+00	B2	HEAST
Cadmium		5.0E-04	HEAST	6.1E+00		B1	HEAST
Chromium		5.0E-03	IRIS	4.1E+01			IRIS
Copper		1.9E-01	(a)				
Cobalt							
Lead	4.3E-04	1.4E-03	(b)	4.0E-02	4.0E-02	B2	EPA REG. 3
Manganese	3.0E-04	1.0E-01	IRIS			D	
Mercury		3.0E-04	HEAST			D	
Silver		3.0E-03	HEAST				
Zinc		2.0E-01	HEAST				
Cyanide		2.0E-02	HEAST			D	
Dioxins/Furans (HxCDD)				6.2E+03	6.2E+03	B2	IRIS
2,3,7,8 - TCDD				1.5E+5	1.5E+5	B2	HEAST

**NOTES:**

- IRIS - INTEGRATED RESEARCH INFORMATION SYSTEM, (10/90)
- HEAST - HEALTH EFFECTS ASSESSMENT SUMMARY TABLES (3RD QUARTER, FY 1990)
- NAPH - NAPHTHALENE RfD VALUE. THIS IS NOT AN EPA VERIFIED RfD.
- (a) - EST. RfD CALC. FROM THE PROPOSED DRINKING WATER STAND. OF 1.3 MG/L BY B&V.
- (b) - RfD CLAC. BY B&V FOR THIS ASSESSMENT BASED ON PREVIOUS PROPOSED MCLG OF 0.02 MG/L.
- THIS IS NOT AN EPA VERIFIED RfD.
- RfD - REFERENCE DOSE
- B(A)P - BENZO(A)PYRENE DERIVED SLOPE FACTOR

**APPENDIX  
RESPONSIVENESS SUMMARY  
ORGANIC CHEMICALS INC. SITE  
GRANDVILLE, MICHIGAN**

**I. Responsiveness Summary Overview**

In accordance with CERCLA 117, the U.S. Environmental Protection Agency (U.S. EPA) held a public comment period from July 22, 1990 through August 20, 1991 for interested parties to comment on the Proposed Plan (PP) for the interim remedial action at the Organic Chemicals Inc. (OCI) Site in Grandville, Michigan.

The PP provides a summary of the background information leading up to the public comment period. Specifically, the PP includes information pertaining to the history of the OCI Site, the scope of the proposed cleanup action and its role in the overall Site cleanup, the risks presented by the Site, the descriptions of the remedial alternatives evaluated by EPA, the identification of EPA's preferred alternative, the rationale for EPA's preferred alternative, and the community's role in the remedy selection process.

EPA held a public meeting at 7:00 p.m. on August 6, 1991 at the Grandville City Council Chambers in Grandville, Michigan to outline the remedial alternatives for the interim action described in the PP and to present EPA's proposed remedial alternative for controlling contamination at the OCI Site.

The responsiveness summary, required by the Superfund Law, provides a summary of citizens' comments and concerns identified and received during the public comment period, and EPA's responses to those comments and concerns. All comments received by EPA during the public comment period will be considered in EPA's final decision for selecting the remedial alternative for addressing contamination at the OCI Site.

This responsiveness summary is organized into sections and appendices as described below:

- I. **RESPONSIVENESS SUMMARY OVERVIEW.** This section outlines the purposes of the Public Comment period and the Responsiveness Summary. It also references the appended background information leading up to the Public Comment period.
- II. **BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS.** This section provides a brief history of community concerns and interests regarding the OCI Site.
- III. **SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES TO THESE COMMENTS.** This section summarizes the oral comments

received by U.S. EPA at the July 25, 1990 public meeting, and provides U. S. EPA's responses to these comments.

IV. WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES TO THESE COMMENTS.  
This section contains the written comments received by EPA containing written comments, as well as EPA's response to those written comments.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

Local awareness of the OCI site has been minimal from the onset because the area has been industrial since 1939 and has not impacted the general public. More interest has been shown by adjacent industries and the numerous generators that have been named potentially responsible parties that shipped spent solvents to OCI for recycling.

A public availability session was held on May 10, 1989 to inform the public of the remedial investigation and sampling and to answer questions concerning the site. Most of the individuals that attended the session included interested land owners adjacent to OCI and were interested in the time frame to perform the investigation and begin remediation.

As part of EPA's responsibility and commitment to the Superfund Program, the community has been kept informed of ongoing activities conducted at the OCI site. U.S. EPA has established a repository at the Grandville Public Library, where relevant site documents may be viewed. Documents stored at the repository include:

- ° The final Phase I Focused Feasibility Study for the site;
- ° The PP for the site;
- ° Fact sheets summarizing the technical studies conducted at the site;
- ° Public Meeting Transcript.

U.S. EPA's selection of a remedy to cleanup the contamination at the OCI site will be presented in a document known as a Record of Decision (ROD). The ROD and the documents containing information that U.S. EPA used in making its decision (except for documents that are published and generally available) will also be placed in the information repository, as will this responsiveness summary.

III. Summary of Major Questions and Comments Received During the Public Comment Period and U.S. EPA Responses to These Comments

Oral comments raised during the public comment period for the OCI Site interim

remediation have been summarized below together with U.S. EPA's response to these comments.

COMMENT: A resident asked if the contaminated area on Figure 4, page 4 of the proposed plan would be fenced and whether warning signs would be posted on the fence.

RESPONSE: A fence will be erected to maintain security for this response action, which will include any extraction wells, distribution lines and treatment facilities. The fence will likely not encompass the area referred to by the resident but will approximate it. Warning signs will be posted on the fence.

#### IV. Written Comments Received During the Public Comment Period.

The written comments regarding the OCI site have been summarized below, together with U.S. EPA's responses to these comments.

COMMENT: One commenter expressed a general concern that removal of the soil in the immediate area of the seepage lagoon would remove the highest concentration of contamination at the site and reduce leaching to the ground water.

RESPONSE: The objective of this interim action is to stop the migration of the contaminant plume. Soils will be addressed as part of the Phase II investigation, which should provide the necessary information to cost-effectively remediate the soils.

COMMENT: One commenter expressed a general concern that the PRP Group has had an inadequate amount of time to respond to the proposed remedy and other aspects of the site.

RESPONSE: By letter dated March 30, 1988, U.S. EPA informed Organic Chemicals, Inc. and Spartan Chemical Company that U.S. EPA, pursuant to Section 122(a) of CERCLA, intended to undertake the RI/FS at the Organic Chemicals site, because neither Organic Chemicals nor Spartan possessed the financial capability to conduct RI/FS activities. This letter also stated that U.S. EPA would not notify the customers/generators at the site of their potential liability because U.S. EPA could not then determine whether these customers/generators were responsible for the site contamination. When, during the course of the remedial investigation, it became apparent that the customers/generators should be notified of their potential CERCLA liability, a PRP address list and General Notice Letters were generated and mailed to the approximately 175 customers/generators on April 9, 1991. These notice letters were put together as expeditiously as possible to facilitate PRP organization. U.S. EPA traveled to Grand Rapids on June 4, 1991, to meet with PRPs and provide information regarding the site and to answer questions that the PRPs had in connection with the site. When the Phase I Remedial Investigation and Focused Feasibility Study was finalized on July 17, 1991, U.S. EPA immediately provided the PRP Steering Committee a copy of the study. In accordance with the public

participation requirements of Section 117 of CERCLA, U.S. EPA released its Proposed Plan for remedial action on July 18, 1991, and was available to answer questions from members of the public at a meeting in Grandville, Michigan on August 6, 1991. In short, U.S. EPA has acted to provide PRPs with notice and to share information concerning the site in its possession as quickly as possible so as to promote an effective PRP response to the selected interim action groundwater remedy.

Reference was also made by the commenter to the exclusion of the State's comments on the FFS from the administrative record. The State's comments were omitted because they did not form a basis for the selection of this response action.

COMMENT: One commenter stated that U.S. EPA's identification of PRPs for the site is incomplete and that U.S. EPA has not considered OCI's chemical manufacturing operations in terms of identifying additional PRPs.

RESPONSE: U.S. EPA, through its PRP search activities, identified over 180 PRPs for the site, most of whom sent various solvents to OCI's solvent recovery operation for recycling. U.S. EPA located over 150 of these PRPs, and 144 PRPs currently comprise the PRP List. Because the site contamination is not divisible between OCI's solvent recycling operation and its chemical manufacturing operation, the PRPs are jointly and severally liable for the entire costs of site remediation. U.S. EPA, in its enforcement discretion, may limit the number of named PRPs at a site to a manageable figure; however, U.S. EPA is willing to evaluate information provided by PRPs that other parties not identified by U.S. EPA are liable parties pursuant to Section 107 of CERCLA.

COMMENT: One commenter has stated that the definition of the "site," as that term has been used in the RI/FFS and in conversation, is unclear.

RESPONSE: The site name, as designated in the National Priorities List at 40 C.F.R. Part 300, Appendix B, is the Organic Chemicals, Inc. site. The site extends over several properties and is defined as the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action. "Areal extent of contamination" refers to both surface area, groundwater beneath the site, and air above the site. The Organic Chemicals, Inc. site should be distinguished from the Organic Chemicals, Inc. property, which refers to the real property located at 3921 Chicago Drive, S.W. in Grandville to which Organic Chemicals, Inc. holds legal title. The OCI property has at times been referred to in an abbreviated manner as the site, when, in fact, the OCI property is a portion of the site.

COMMENT: One commenter has stated that there is no "imminent and substantial endangerment" presented by the site.

RESPONSE: Section 106(a) of CERCLA authorizes the President to take certain actions when the President determines that there may be an "imminent and substantial

endangerment" to the public health or welfare or the environment because of an actual or threatened release of a hazardous substance from a facility. The President has delegated this authority to the Administrator of EPA, who, in turn, has delegated this authority to the Regional Administrators. In this case, an imminent and substantial endangerment exists because numerous hazardous substances are present at, and migrating from, the OCI facility, as documented by the Phase I RI/FFS. These hazardous substances have contaminated the soil and groundwater at the site to unacceptably high levels, and further migration of the hazardous substances present in the groundwater is threatened.

COMMENT: One commenter has stated that the interim response activity proposed by the EPA is not consistent with the National Contingency Plan. (No specifics were provided.)

RESPONSE: The procedures followed by U.S. EPA in selecting the proposed interim response remedy are consistent with the procedures delineated in the National Contingency Plan, found at 40 C.F.R. Part 300. The selected interim response action itself was selected pursuant to the criteria established by the National Contingency Plan and provides the most appropriate remedial action for the site problem that is being addressed in this Record of Decision. Since the commenter failed to provide specifics with regard to what components of the NCP the response action is inconsistent with, U.S. EPA has no basis to respond further to the commenter.

COMMENT: Other remedial alternatives presented in the FFS are more appropriate with respect to the conditions at the site than the interim response activity proposed by EPA.

RESPONSE: The commenter failed to specify which alternatives presented in the FFS are more appropriate. As such, U.S. EPA continues to believe that alternatives 1 and 2 will not meet the objective of the interim action which is stop the migration of the contaminant plume. Alternative 3 is a biological treatment system that is subject to upsets resulting in occasional exceedances of discharge requirements, and is, therefore, not as reliable as alternative 4.

COMMENT: Maps and Plans are of generally poor quality. A proper base map is necessary to support a clear and accurate presentation of RI data and the drawing of proper conclusions from that data. The variable format of figures used in the RI/FFS makes the data difficult to understand.

RESPONSE: Original maps should be of readable quality and the data has been presented adequately in the maps. The objective of this interim action is to stop the migration of the contaminant plume and the data and graphics provided in the RI/FFS supports this decision. Base maps will be provided as part of the Phase II RI.

COMMENT: A second oil refinery operated northwest of the OCI property; sand and gravel mining took place on the adjacent property with unidentified fill materials. None

of these historic land uses have been adequately documented.

**RESPONSE:** There is no evidence from aerial photographs from 1938 when the area was farmland to the present that a second refinery was operated northwest of the OCI property. The gravel pits that are adjacent to the property are filled with clean material according to the manager of Meekhoff Trucking.

**COMMENT:** There is a lack of detail on the former oil refinery operation. Given the period of time the refinery operated, more detail on its operation and contribution to soil and ground-water quality is appropriate.

**RESPONSE:** Oil related contamination was not part of the scope of work for this RI/FFS. This contamination will be investigated in the Phase II RI.

**COMMENT:** Fill material brought to the site could affect the performance of the ground-water extraction system and may have contained contaminated material. Fill identified in Mateco boreholes are not mentioned in Black & Veatch logs.

**RESPONSE:** The effect of the soils with regard to ground water extraction system will be evaluated as part of design of the extraction system. No evidence indicates that contaminated fill was brought to the site as discussed with the manager of Meekhoff Trucking. Soil boring logs are to be considered as a description of the soils and geology as noted by the geologist in the field and were not classified whether fill material was present or not.

**COMMENT:** Physical evidence of contamination in the borehole logs such as oil coated soils and odors is not supported by ground water quality analysis in various areas of the site.

**RESPONSE:** The scope of this investigation did not include oil related contamination. This will be further investigated as part of the Phase II RI.

**COMMENT:** The ground water flow direction and gradient in the lower ground water system should be defined. The investigation should not be extensive and should be limited to two additional wells in the LGS to define gradient and direction of the LGS ground-water flow.

**RESPONSE:** Additional wells will be installed in the LGS to adequately determine the extent of contamination, gradient and direction of flow as part of the Phase II investigation.

**COMMENT:** Private wells (non potable) had high metal concentrations likely related to well construction. The risk assessment assumes that drinking water wells will be placed in the UGS. This is unrealistic because water is supplied by the City of Grandville and if



wells were installed it would be in the LGS.

RESPONSE: The FFS states that high metal concentrations found in residential non potable wells is likely related to plumbing. The risk assessment assumes that contaminants from the UGS will migrate to the LGS where the groundwater could be used for potable purposes. The remedial action is intended to reduce the chance for further migration of contaminants from the UGS to the LGS.

COMMENT: Ground water sampling was performed over an unacceptably long period of time for both Round 1 and Round 2.

RESPONSE: Upon further review of field logs it was noted that the RI/FFS inaccurately presents the sample collection dates. The correct dates of groundwater sampling are September 19 - 26, 1989 and November 7 - 13, 1989. As such, the ground-water sampling was performed over an acceptable period of time.

COMMENT: The use of three different bailers (stainless steel, teflon, and PVC) increases the importance of the analysis of field blanks. Field blanks should have been coordinated with bailer type to assess possible patterns in sample collection interference on analytical results. It would be useful to summarize decontamination procedures at this point in the text to permit comparison with the QAPP, to identify the bailer cord material and its possible impact on analytical results and to evaluate the adequacy of sample collection and handling procedures.

RESPONSE: Bailer type was not designated in the approved QAPP. Bailer type was not noted in the field log notes. Therefore is not possible to coordinate bailer type with blank samples. The impact of bailer cord on analytical results is insignificant with and irrelevant to selection and implementation of this response action.

COMMENT: Residential well monitoring was conducted on only one occasion and was inconclusive.

RESPONSE: Additional monitoring of residential wells will be performed as part of the Phase II RI and will be compared with the initial results.

COMMENT: The FFS did not include consideration of alternative ground water collection methods. Such alternatives could be more useful and more cost-effective. Discharge options should be further assessed after determining treatment efficiencies. Ground water recharge through an infiltration gallery could be used to flush contaminants back to the extraction wells and should have been considered.

RESPONSE: Extraction well pumping was chosen through the screening process in the FFS. Other methods were considered in the FFS but were screened out for reasons stated

in the FFS. The primary criteria used for screening in the FFS were effectiveness, implementability, and cost-effectiveness. Other methods can be considered in remedial design if shown to be more cost-effective. The method specifically mentioned above was considered in the FFS but was eliminated because of the concern that aquifer reinjection may cause unforeseen hydraulic gradients in the upper ground-water system, causing accelerated and uncontrolled dispersion of contaminated plumes. Furthermore, groundwater recharge standards may be much more difficult to attain than surface water discharge limits.

**COMMENT:** If ground water extraction is selected then a test well should be pumped for several days to ensure that the zone of interception is fully developed before conducting treatability tests on extracted water. The low flow rate anticipated could be pretreated in the on-site aeration basin for the duration of the test. After establishing the zone of interception for EW1, EW2 could be installed at an optimized location and simultaneously tested. EW-3 would be installed only if necessary based on the optimized location of EW-2. Monitoring wells around EW-3 suggest that water quality may not merit pumping. All test waters could be directed to the on-site treatment works for pretreatment and discharge to the Grandville POTW. The low flow rate should make both the vapor release of contaminants and hydraulic loading at the POTW tolerable for the few weeks of testing.

**RESPONSE:** Treatability tests are planned prior to remedial design. Use of the treatment works at OCI with discharge to the Grandville POTW would have to be properly coordinated with OCI and the City of Grandville.

**COMMENT:** There is not enough information available to make a proper, fact based objective, selection of treatment at this time. The combined flow from pumped wells is the only accurate measure of raw water quality that must be treated. Treatability testing on the combined flow is required before treatment can be optimized using effective treatment efficiency and cost analysis.

**RESPONSE:** Other physical, chemical treatment alternatives can be evaluated as part of treatability tests than those in Alternative 4.

**COMMENT:** The selection of Alternative 4 is not adequately explained. UV/H<sub>2</sub>O<sub>2</sub> should remain in consideration due to the relatively low flow anticipated, high destructive efficiency of such treatment and its apparent lower cost. Even if carbon polishing is required this treatment may still be more cost-effective than relying on carbon for primary treatment.

**RESPONSE:** Alternatives 1 and 2 will not meet the objective of the interim action which is stop the migration of the contaminant plume. Alternative 3 is a biological treatment system that is subject to upsets resulting in occasional exceedances of discharge requirements, and is, therefore, not as reliable as alternative 4. The basis for the selection of Alternative 4 is presented in more detail in the ROD. See response to previous

comment for the second portion of the comment.

COMMENT: Treatability tests are necessary for proper design of the treatment system.

RESPONSE: Treatability tests are required prior to design, as discussed in the ROD.

COMMENT: UV oxidation should be considered a primary treatment on its own. Biological treatment should have been given lower consideration. BOD is already too low to support biological population and groundwater is generally low in nutrients, which would necessitate feeding the bioreactor regularly.

RESPONSE: The biological treatment proposed as part of Alternative 3 is considered necessary because of the high COD concentrations in the influent. In Appendix G of the FFS the values for BOD and COD entering the groundwater treatment facility are 17 and 468 mg/L, respectively. It is expected that some of the influent COD will be converted to BOD during the UV-oxidation process. To account for this, it was assumed that the BOD exiting the UV-oxidation unit will be approximately 30% of the influent COD (i.e.  $\text{BOD} = 0.3 (468 \text{ mg/L}) = 140 \text{ mg/L}$ ).

Also, the BOD test is performed with an unacclimated seed. Due to the nature of the toxic chemicals in the groundwater, it is unlikely that a five-day BOD test will accurately predict the "true" value of BOD that this waste stream would exert upon surface water, which has developed an acclimated microbial population. Therefore, the groundwater is expected to have sufficient BOD to sustain an activated sludge process.

COMMENT: Monitoring wells were drilled into the LGS without double casing, allowing contaminants to migrate from the UGS to the LGS.

RESPONSE: All LGS wells installed during the Phase I RI were double cased.

COMMENT: Sample holding times were exceeded on Rounds 1, 2 and 3 and result in qualified data and uncertainty in the interpretation of results.

RESPONSE: This sampling will be performed again as part of the Phase II RI or as part of design. It is unlikely that more accurate data will change the conclusions made to date.

COMMENT: There are insufficient background samples to establish the natural inorganic variation in local soils. MDNR guidance specifies a minimum of four background samples per soil unit. There was no indication that the sample collected was native to the area and not imported fill acquired during the development of the area.

RESPONSE: The number of background samples collected conformed to the approved sampling plan. Additional background samples are planned to be collected as part of the Phase II RI.

NATURAL RESOURCES COMMISSION

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DEPARTMENT RECTOR, Director

Roland Harmes, Director  
September 27, 1991

Mr. Valdas Adamkus, Regional Administrator  
U.S. Environmental Protection Agency  
Region 5, 5RA-14  
230 South Dearborn Street  
Chicago, Illinois 60604

Dear Mr. Adamkus:

The Michigan Department of Natural Resources (MDNR), on behalf of the State of Michigan, has reviewed the Record of Decision (ROD), for the Organic Chemicals, Inc. (OCI) Superfund site (Kent County) upper groundwater system interim action and the proposed remedy contained in that ROD. The State concurs with the remedy proposed in the ROD consisting of:

1. the installation, operation and maintenance of an interim groundwater extraction system in the upper groundwater system consisting of three extraction wells (at a minimum);
2. the installation, operation and maintenance of a groundwater physical/chemical treatment system for the interim groundwater action which is specifically designed to:
  - a. prevent the further migration of the contaminant plume in the upper groundwater system while the site is further investigated,
  - b. meet all air and groundwater permit discharge requirements (or limits, as appropriate), including any requirements for treatment of metals, dioxins, furans or tentatively identified compounds (TICs), and
  - c. be sufficiently flexible to allow modifications of the design of the purge and treatment systems based on operating experience (e.g. a pilot scale treatability study), including evaluation of the effectiveness of the treatment system at removing unidentified compounds; and
3. a monitor well sampling program designed to determine the effectiveness of the groundwater extraction system in reducing contaminated groundwater from entering the lower groundwater system and preventing further migration of the contaminant plume in the upper groundwater system.

Mr. Valdas Adamkus

-2-

September 27, 1991

It is the State of Michigan's understanding that further investigation of the upper and lower groundwater systems, the soil, the oil and the OCI facility is warranted and will be conducted during the next phase of the remedial investigation. We also understand that the final remedial action at the site will address all site-related contamination in the entire upper and lower groundwater systems, and all site-related contaminated soils because the interim action will not. The final remedial action will also meet all applicable or relevant and appropriate requirements (ARARs), most of which are being waived for the interim action.

We understand that the specific types of treatment will be determined in the remedial design phase and will probably consist of granular-activated carbon, air stripping, and/or possibly UV/oxidation with some form of biological treatment.

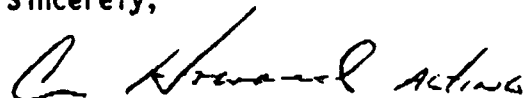
We understand that, because this is a limited interim action, the U.S. Environmental Protection Agency is waiving many of the ARARs; therefore ARARs need not be as comprehensive as they would be for an operable unit. However, the State of Michigan considers all substantive portions of the following acts as ARARs for the interim action selected:

the Michigan Water Resources Commission Act (1929 P.A. 245, as amended) and associated rules;

the Air Pollution Act (P.A. 348 of 1965, as amended), and the Michigan Air Pollution Control Commission General Rules

We urge your continued efforts to implement this interim action as soon as possible and will continue our efforts to this end as well. If you or your staff have any questions, please contact Ms. Beth O'Brien at 517-335-3098 or me.

Sincerely,



Delbert Rector  
Deputy Director  
517-373-7917

cc: Mr. Jonas Dikinis, EPA  
Ms. Wendy Carney, EPA  
Mr. Tom Williams, EPA  
Mr. Alan Howard, MDNR  
Mr. William Bradford, MDNR  
Mr. Scott Cornelius, MDNR  
Ms. Beth O'Brien, MDNR